

Quickbird Geometry Report for Summer 2003

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GEOMETRY REPORT 2003

Introduction

Digital Globe provides for general use 2.4 m multi-spectral and 0.7 m panchromatic imagery acquired by the Quickbird satellite. This geometrically corrected imagery was obtained as 'standard' and 'orthorectified' products; the difference between the two products is primarily in the degree of geometric accuracy that Digital Globe claims. For both products, every image pixel contains estimated sets of Northing/Easting and lat/long coordinates accessible through an image display application such as ENVI. Ground processing was performed by Digital Globe using the ADP 2.1 version of their system.

Analysis conducted at South Dakota State University attempted to verify the geometric accuracy of standard and orthorectified Quickbird imagery to determine if specifications for the NASA Science Data Purchase (SDP) were met. These specifications are in Table 1 of Appendix 1. In this analysis, we had approximately 90 Ground Control Points (varies depending on scene size on each date), uniformly distributed over the Brookings, SD, area, from 4 Quickbird scenes acquired August 23, September 15, and October 21 of 2003. The satellite elevation angles on these

dates are shown in Table 2 of Appendix 1. The northing and easting coordinates for these features were then compared to northing and easting coordinates for the same features from GPS measurements acquired by the Stennis GRIT team during June 2000 and September 2002. The mean Northing and Easting errors (difference between the image coordinates and the corresponding GPS measured coordinates), their standard deviations, and RMSE were estimated. Digital Globe provided Quickbird terrain corrected imagery through the SDP for analysis. This report discusses the procedures used for this analysis, and presents the results that were obtained in 2003.

Procedure

1. Ninety ground control points were selected in the Brookings, SD, region. Points chosen were clear and observable in all seasons, easy to access and were uniformly distributed.
2. Latitudes and longitudes were accurately measured for selected points using GPS instrumentation on the ground.
3. Position information from the Quickbird images was obtained by three individuals.

4. Mean error, STD, RMSE and 90% circular error were calculated.

As mentioned in the Introduction, the Stennis GRIT team came to the Brookings, SD area in June 2000 and again in September 2002 to obtain GPS measurements of various features. The selected features needed to be clearly visible in both the panchromatic and multispectral imagery and easily accessible on the ground. The GPS instrument accuracy was better than 5cm. Suitable candidates for selection included road intersections, centers of driveways, and corners of parking lots. Measurements to centimeter precision were obtained for the selected features by a portable GPS unit that relied on triangulation with two ground reference units to provide localization; one reference unit was stationed at the Brookings airport (NGS PID PR1201), while the other was stationed along the east side of the northbound lane of Interstate 29 (PID PR 1044), about one mile north of Brookings. Figure 1 shows the locations of both the selected features (yellow boxes), and the ground reference points (red boxes).

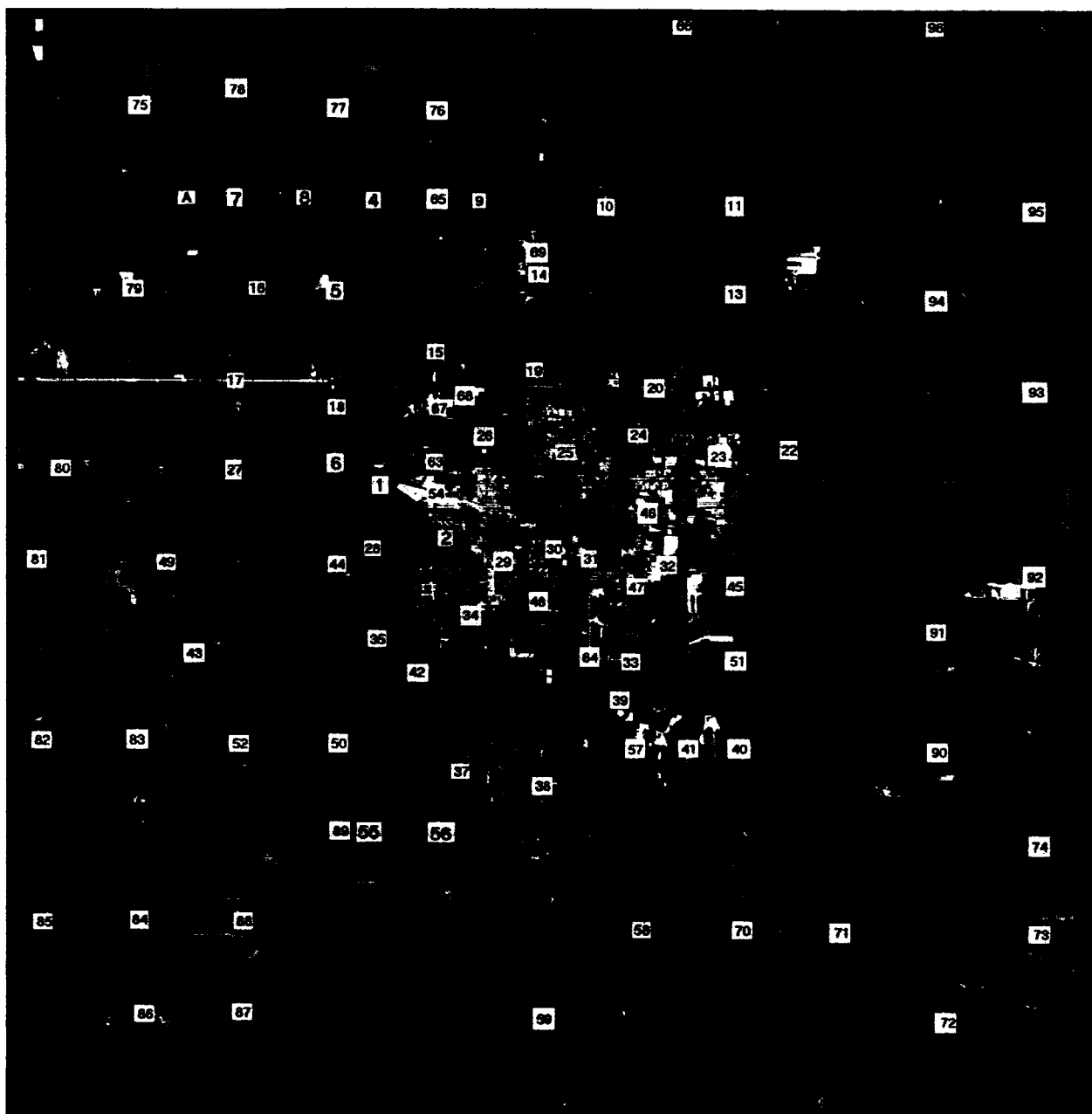


Fig. 1 Brookings, SD Test Site

GCP Locations
 Base Stations

The panchromatic and multi-spectral scenes were examined to locate the selected features to sub-pixel accuracy. For the 2003 test scenes, the missing feature identity numbers in the spreadsheets (Appendix 3) implies that the

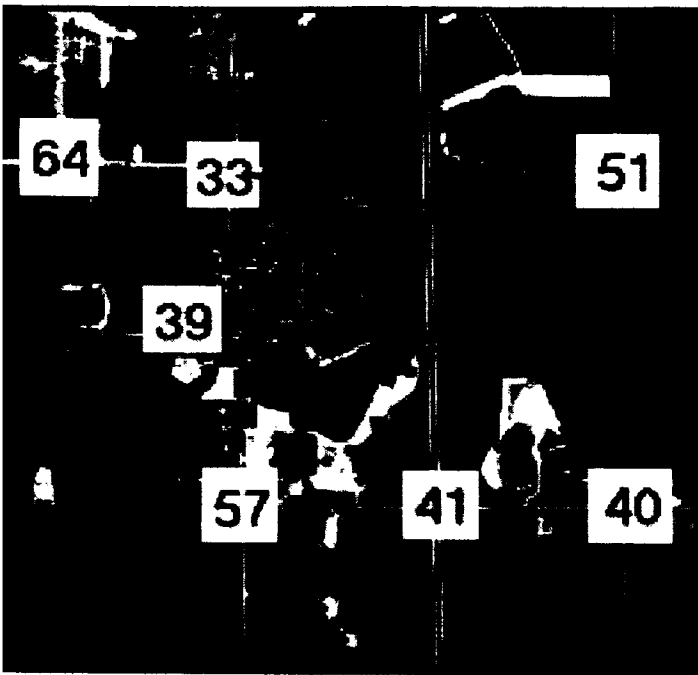
corresponding features were either not visible in the imagery or were cropped due to image size restrictions, and hence were not included in the analysis. For all features that were visible, the Northing and Easting coordinates were recorded.

The image-based Northing and Easting coordinates were then compared with the corresponding GPS-measured coordinates by calculating the mean error, standard deviation, and RMSE. All calculations were performed in Microsoft Excel spreadsheets.

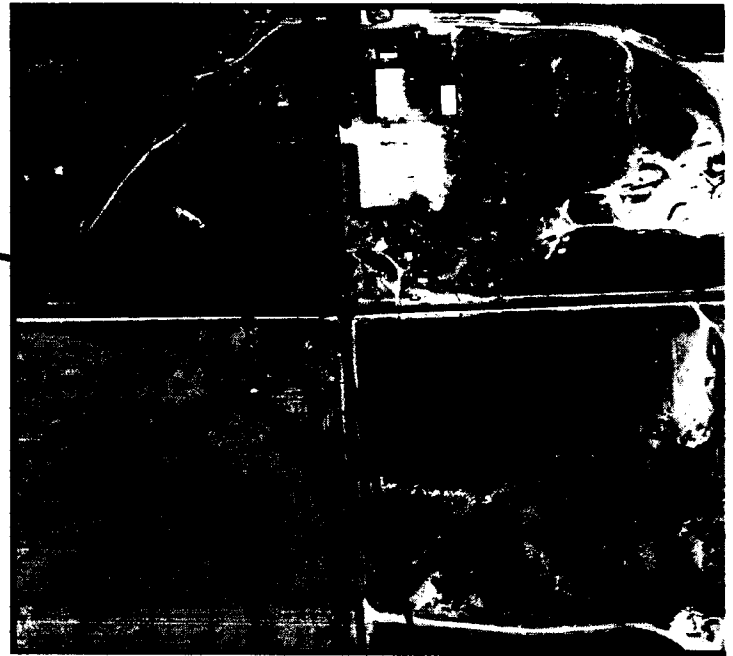
CE-90 was estimated using the empirical approach. That is, the smallest diameter circle that enclosed 90% of the GCP errors was determined. This diameter is then the CE90 estimate.

Figure 2 shows a sample Quickbird image acquired on September 15, 2003. Figure 2 also illustrates the steps followed to acquire the image-based GPS coordinates of Point 33.

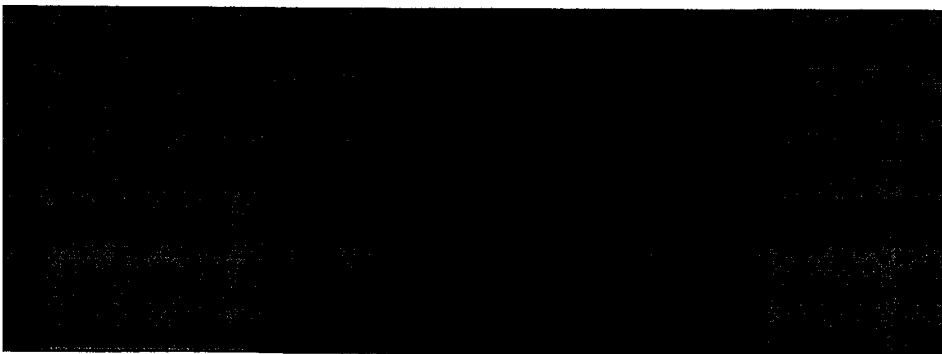
Sample Quickbird Image of Brookings, SD Test Site on September 15



Step 1



Step 2



Cursor Location/value of Point 33



Step 3

Results and Analysis

Results of the 2003 Quickbird geometry analysis are shown in Table 1 and Appendix 2. Table 1 indicates summary statistics for each scene including both mean northing and easting errors, northing and easting RMSE, total RMSE (the orthogonal sum of northing and easting RMSE), and estimated CE90. Appendix 2 contains plots of the positional error for each GCP and each data collect. Superimposed on these plots is the estimated CE90 circle. Also included in Appendix 2 are vector plots. These plots show the magnitude and direction at each GCP location and are useful for identifying secondary error effects.

Important results are listed in bulleted form below.

- All three Standard imagery products and the orthorectified product met the specifications of 23m and 12.7m CE90 respectively.

(Note: CE90 was based on the radius of the circle in the scatter plots of Appendix 2.)
- The RMSE varied from 16.6 to 11.5 meters for the standard product while the orthorectified product exhibited an RMSE of 5.9m.
- There is an overall bias towards the north and east on all images.

- Most of the pointing errors were due to bias in the easting and, to a lesser extent, northing coordinates.
- The Orthorectified product a CE90 = 8.0 m in the panchromatic band mainly due to easting errors.
- Little difference in geometric error exists between the panchromatic and multispectral bands.

BROOKINGS SUMMER 2003 QUICKBIRD GEOMETRIC

RESULTS

PANCHROMATIC BAND											
BROOKINGS, SD TARGET											
Product	Date	Mean Northing Error	Northing Error Std.	Mean Easting Error	Easting Error Std.	Mean Error Std.	Northing RMSE	Easting RMSE	RMSE	CE 90	satellite elevation
Standard	8/23/2003	9.51	2.06	6.88	1.64	11.88	8.76	7.49	11.53	12.67	76.80
Standard	9/15/2003	8.73	0.06	13.79	0.25	16.32	9.05	13.91	16.59	17.40	83.30
Standard	10/21/2003	7.90	1.11	9.36	1.53	12.32	8.01	9.48	12.41	13.62	81.30
Ortho	8/23/2003	0.70	1.22	5.47	1.88	5.72	1.42	5.74	5.91	7.97	76.80
MULTISPECTRAL BANDS											
BROOKINGS, SD TARGET											
Product	Date	Mean Northing Error	Northing Error Std.	Mean Easting Error	Easting Error Std.	Mean Error Std.	Northing RMSE	Easting RMSE	RMSE	CE 90	satellite elevation
Standard	8/23/2003	8.43	1.33	7.37	1.46	11.28	8.14	7.31	10.95	12.81	76.80
Standard	9/15/2003	7.77	0.60	13.73	1.24	15.80	8.37	14.11	16.41	17.37	83.30
Standard	10/21/2003	7.33	2.32	9.75	1.85	12.34	7.73	9.93	12.61	13.75	81.30
Ortho	8/23/2003	-0.31	1.58	5.32	2.21	5.73	1.74	5.76	6.03	7.54	81.30
Notes:	All measurements in meters. Satellite Elevation in degrees Measurements based on 31 GCP's in and around Brookings, SD. Three different individuals were involved with the analysis of each scene. SDP Spec: 23m CE90 (Standard Product) 12.7m CE90 (Orthorectified Product)										

Table 1. Results of Quickbird geometric analysis in 2003.

Comparison of 2002 and 2003 Results

- The accuracy of the orthorectified product improved from a CE90 of 7.97 meters in 2003 compared to CE90 of 2.7 meters in 2002.
- Geometry accuracy of standard products improved in 2003 (18.8m average) when compared to 2002 (14.6m average).
- If the August 8, 2002 date is not included, then the average CE90 for 2002 increases substantially to 22.6m. Based on the rest of the standard 2002 collections, it would appear that the accuracy obtained on August 8 is atypical.

Table 4.19 Comparison of 2002 and 2003 Pan Band Results

Date	Product Type	Spec.	CE90
6/27/2002	Standard	23m	22.80m
7/20/2002	Standard	23m	24.00m
8/ 7/2002	Standard	23m	15.97m
8/25/2002	Standard	23m	3.34m
9/7/2002	Standard	23m	27.80m
9/7/2002	Orthorectified	12.7m	2.79m
8/23/2003	Standard	23m	12.67m
8/23/2003	Orthorectified	12.7m	7.97m
9/15/2003	Standard	23m	17.40m
10/21/2003	Standard	23m	13.62m

These results indicate that the pointing ability of Quickbird improved significantly from 2002 to 2003.

Appendix List

**Appendix 1. Satellite Elevation Angles
and SDP Specifications**

**Appendix 2. QUICKBIRD CE90 Plots and
Vector Error Plots**

Appendix 1

Table 1. QUICKBIRD Product Specifications in 2003

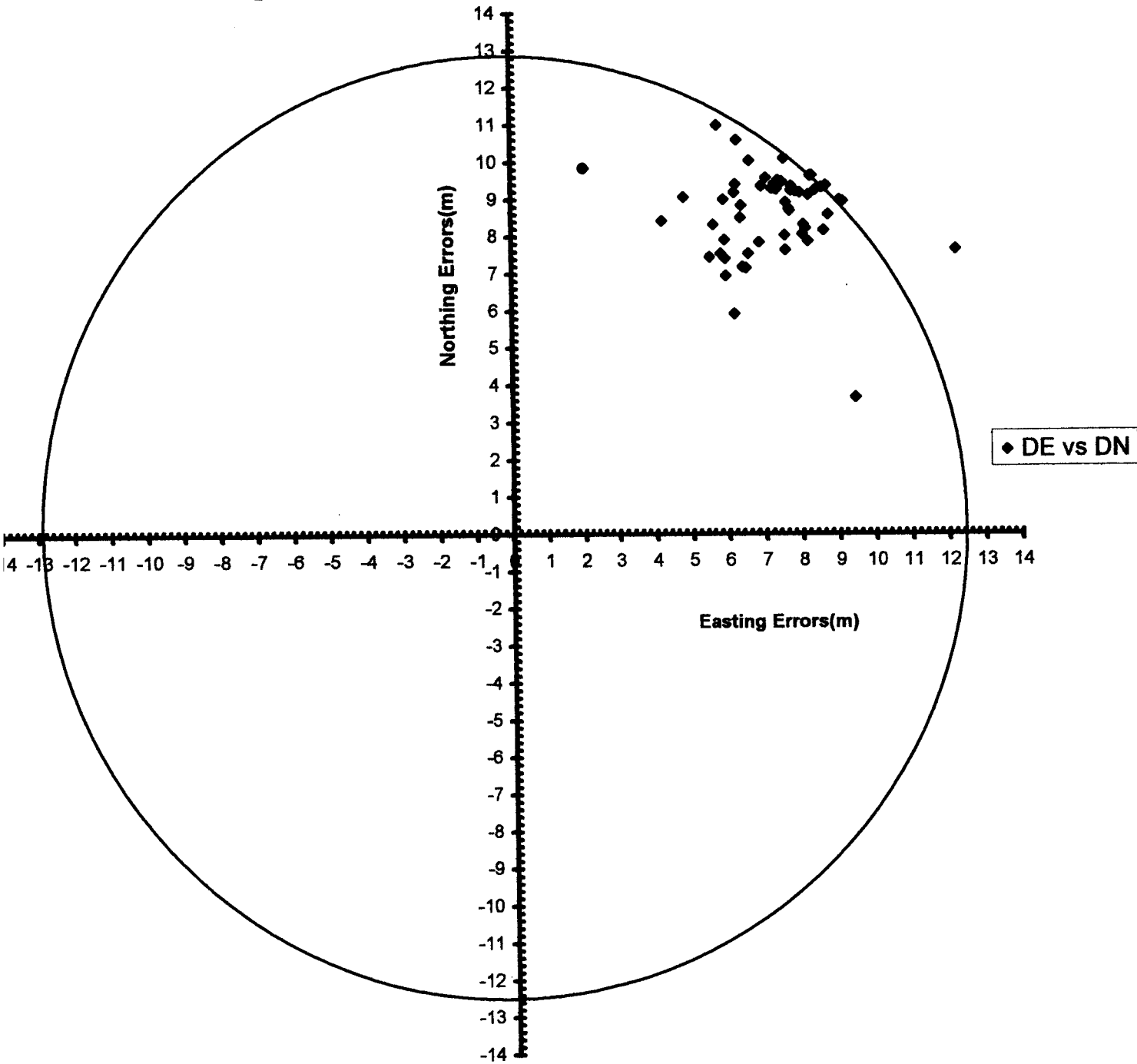
Date	Product Type	Order number	ADP version	Circular Error 90 Pan Band (Meters)	
				Specification	Observed
8/23/2003	Standard	37889	2.0	23 meters	12.67meters
9/15/2003	Standard	37896	2.0	23 meters	17.34 meters
10/21/2003	Standard	37897	2.0	23 meters	13.62 meters
8/23/2003	Orthorectified	38335	2.0	12.7 meters	7.97meters

Table 2. Quickbird Elevation Angles in 2003

	Azimuth	Elevation
Date	(degrees)	(degrees)
08-23-2003	148.3	76.8
09-15-2003	285.3	83.3
10-21-2003	279.5	81.3

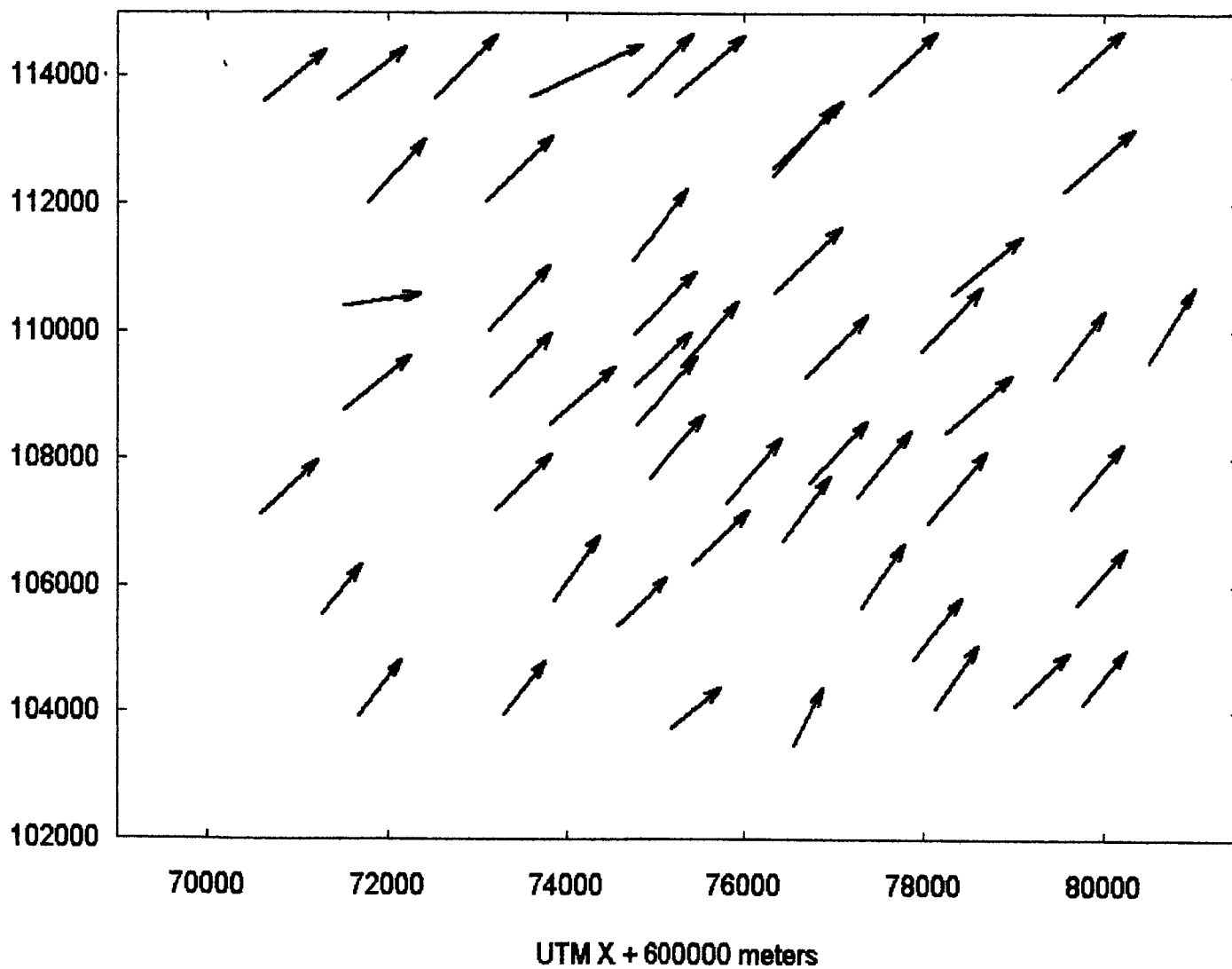
Appendix 2

Quickbird Aug 23, 2003 Pan Band CE90% Plot (CE90%=12.67 m)

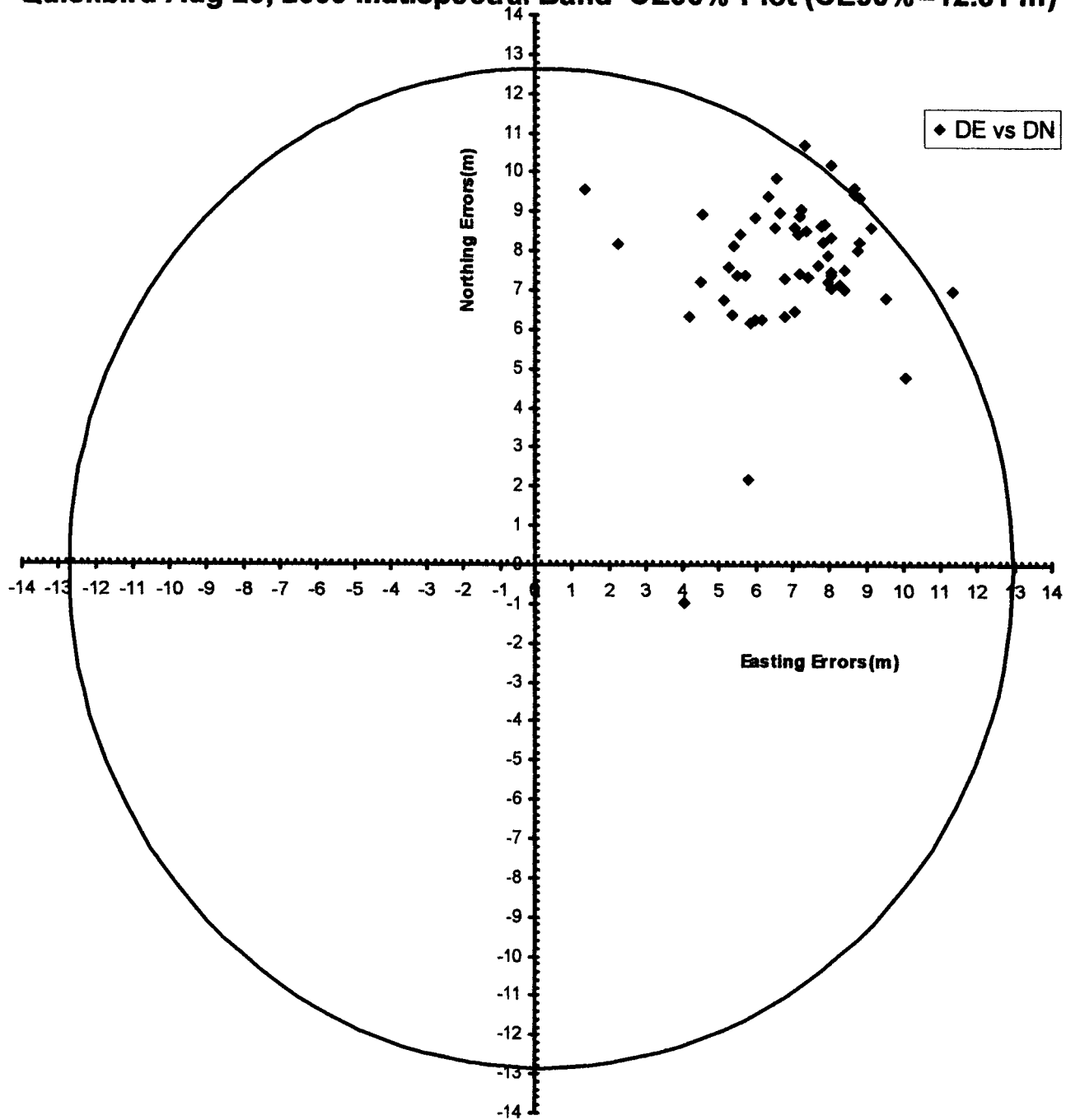


Quickbird PANBAND Geolocation Errors for Brookings, SD 08-23-2003

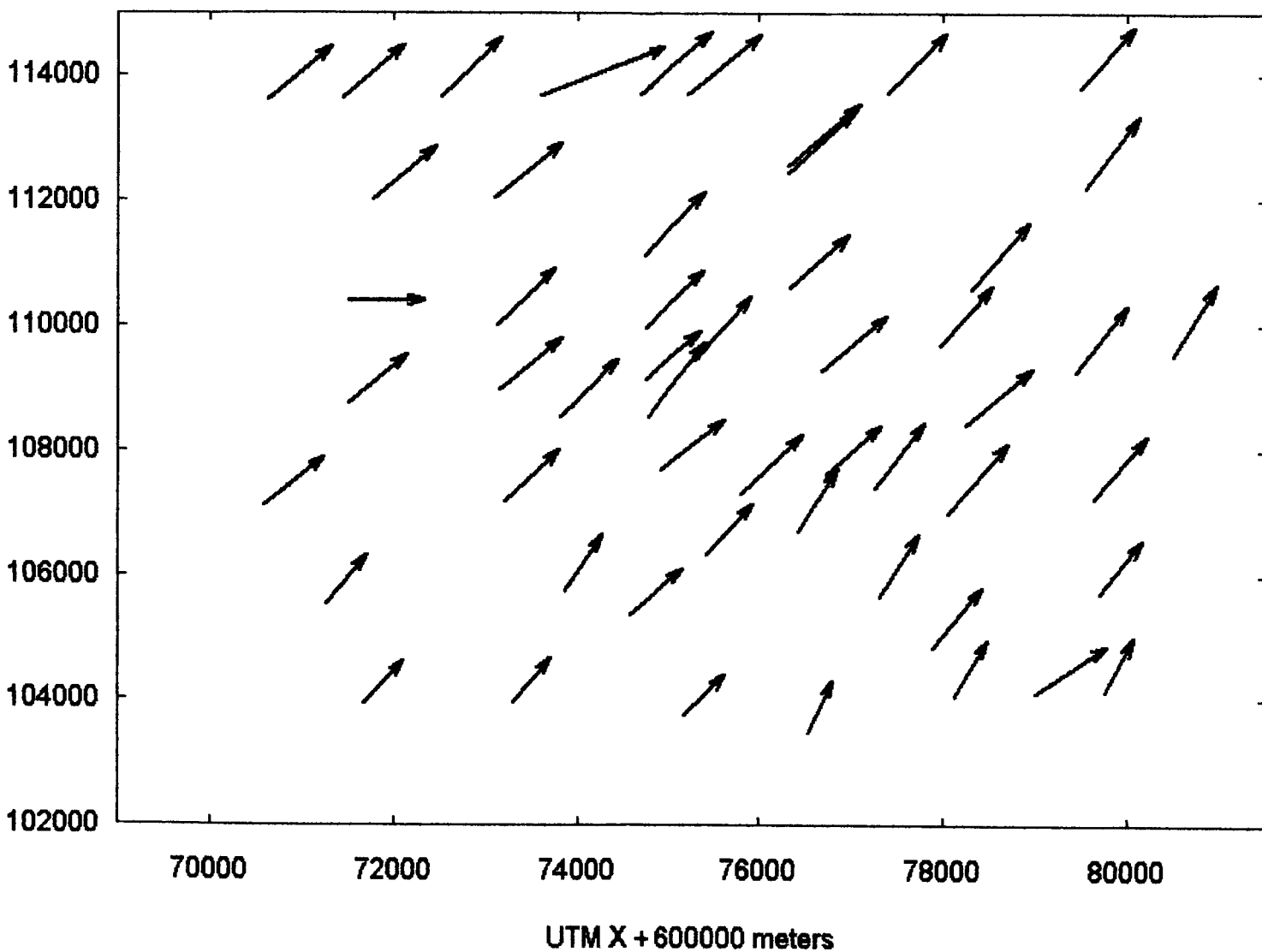
Errors Scaled 100x



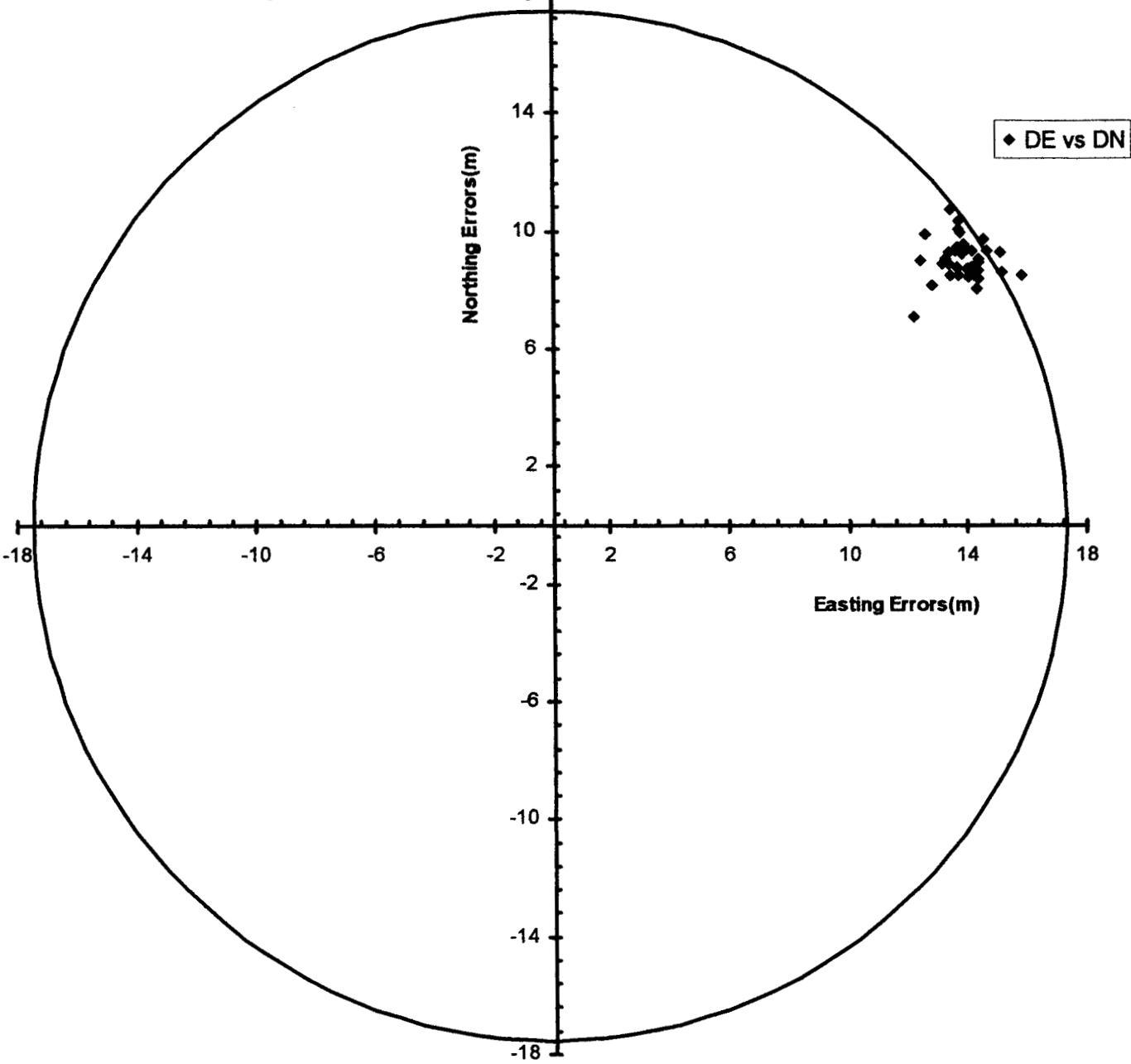
Quickbird Aug 23, 2003 Multispectral Band CE90% Plot (CE90%=12.81 m)



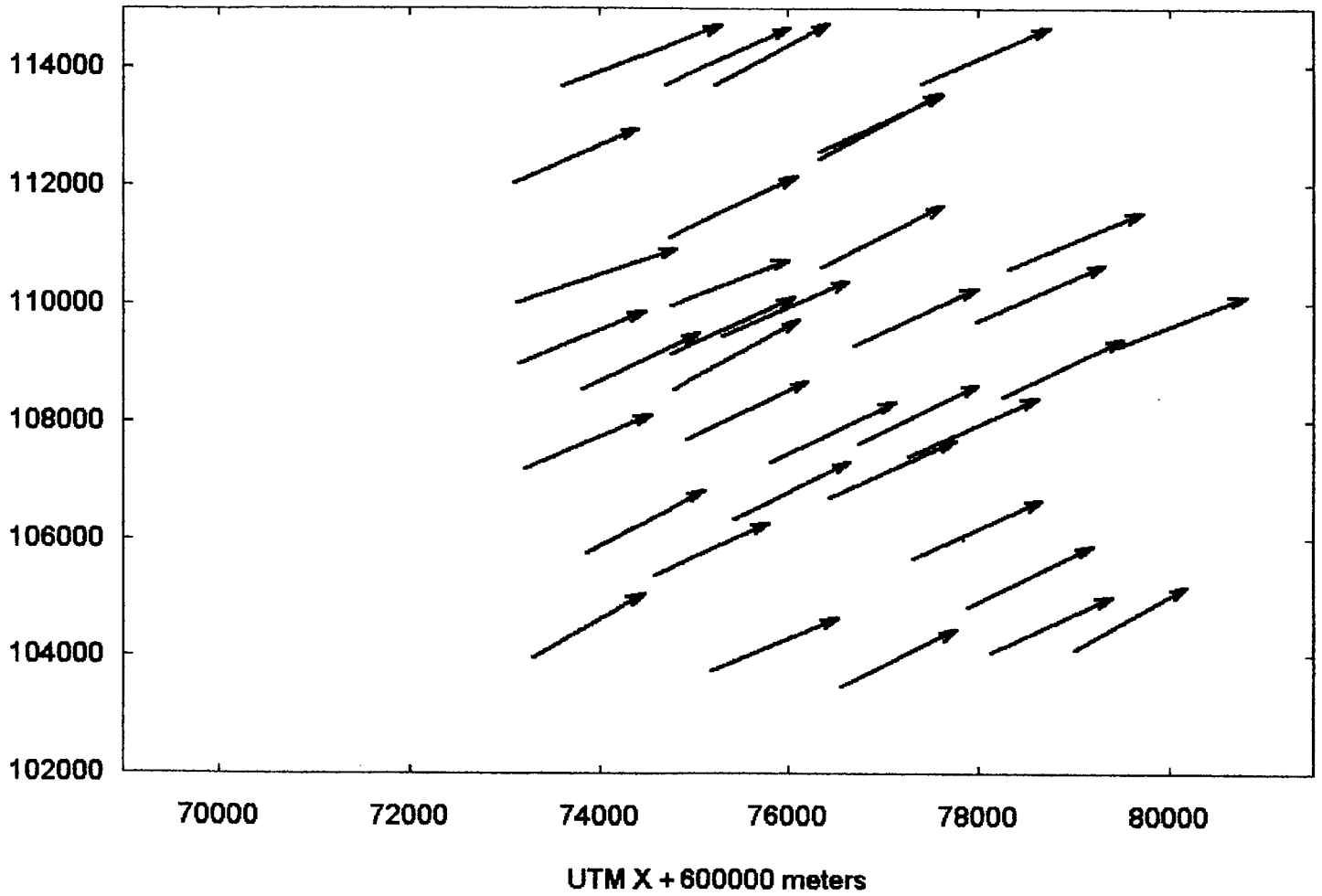
Quickbird Multispectral band Geolocation Errors for Brookings, SD 08-23-2003
Errors Scaled 100x



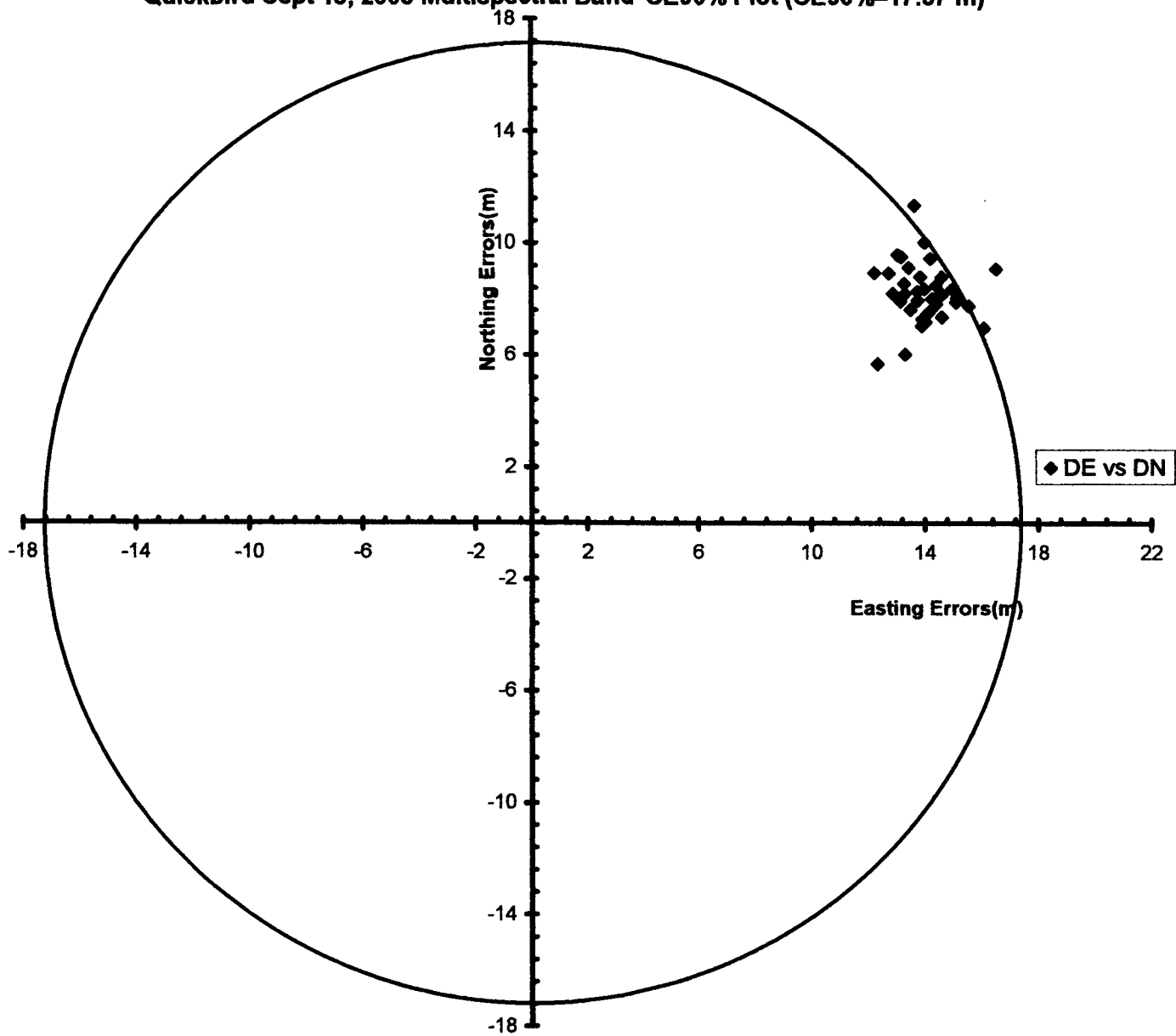
Quickbird Sept 15, 2003 Pan Band CE90% Plot (CE90%=17.4 m)



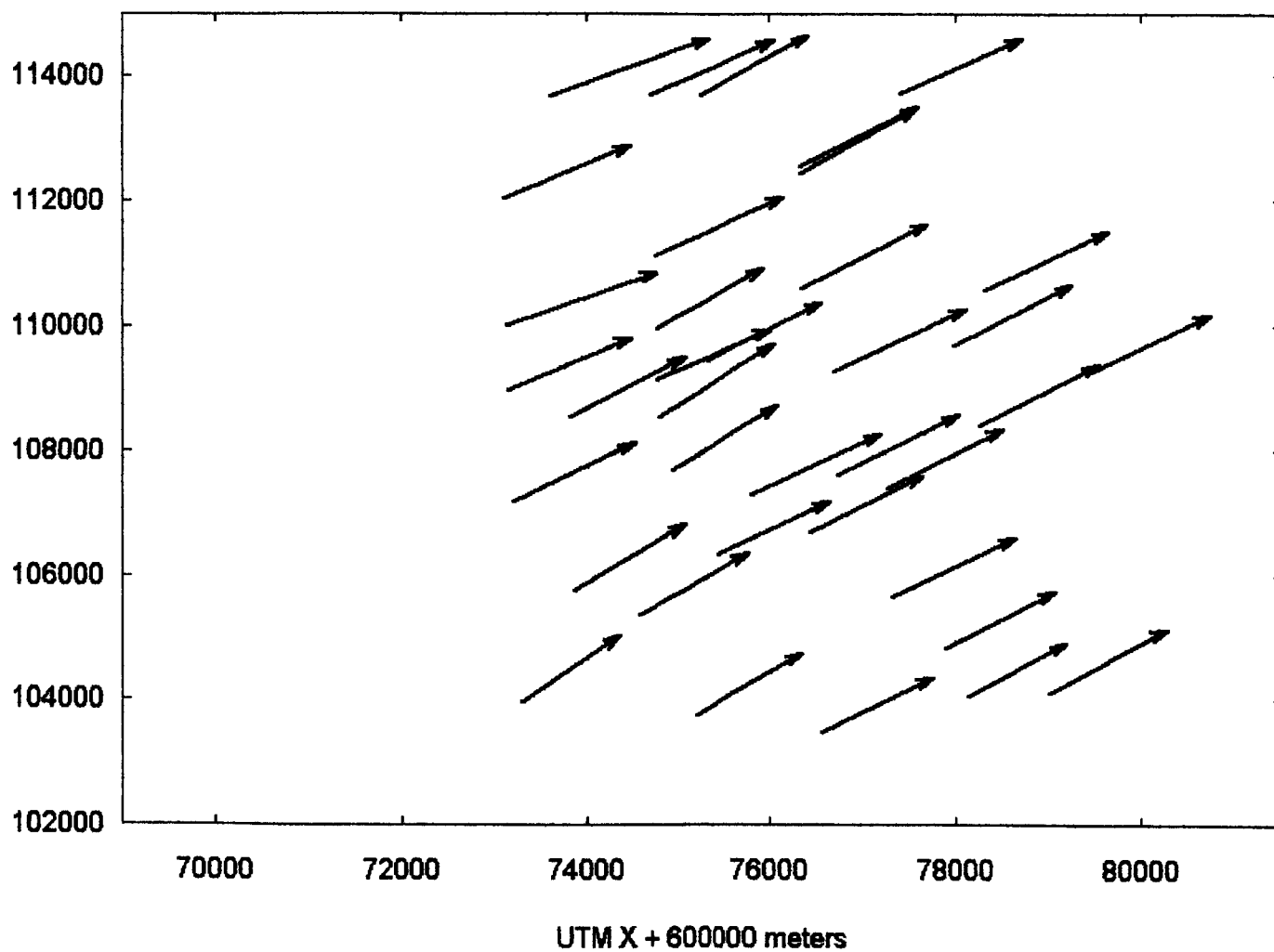
Quickbird PANBAND Geolocation Errors for Brookings, SD 09-15-2003
Errors Scaled 100x



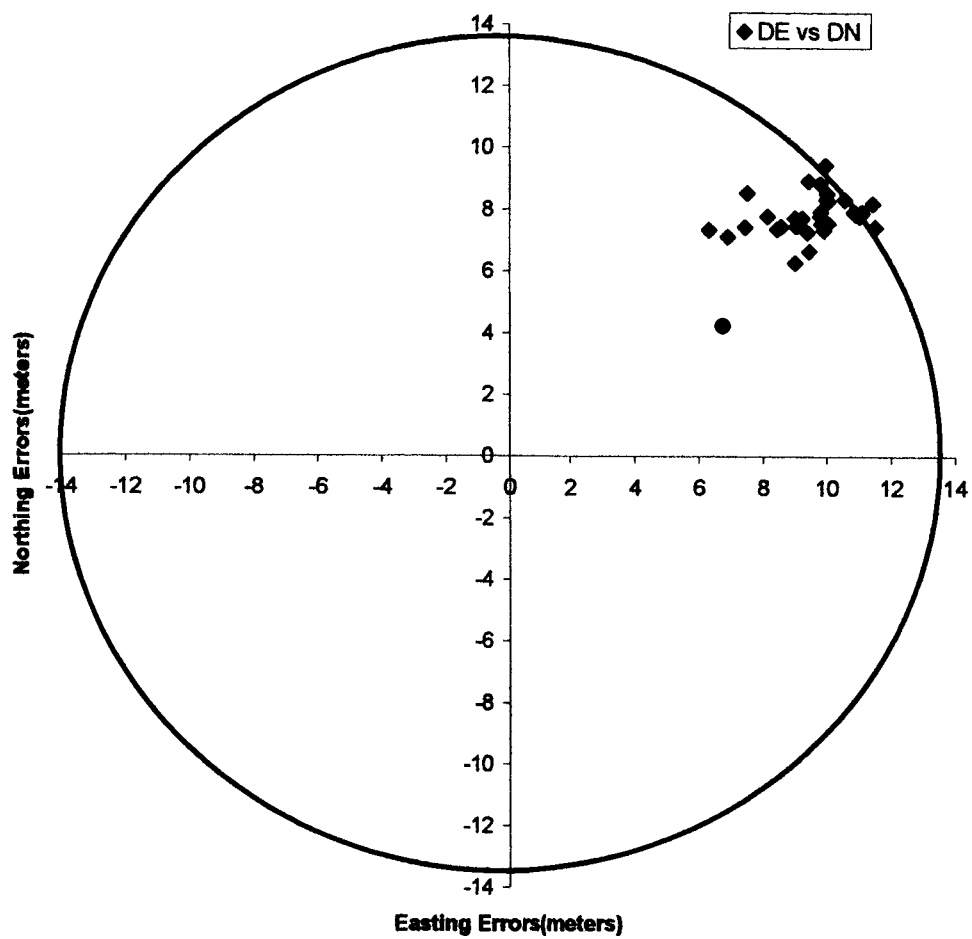
Quickbird Sept 15, 2003 Multispectral Band CE90% Plot (CE90%=17.37 m)



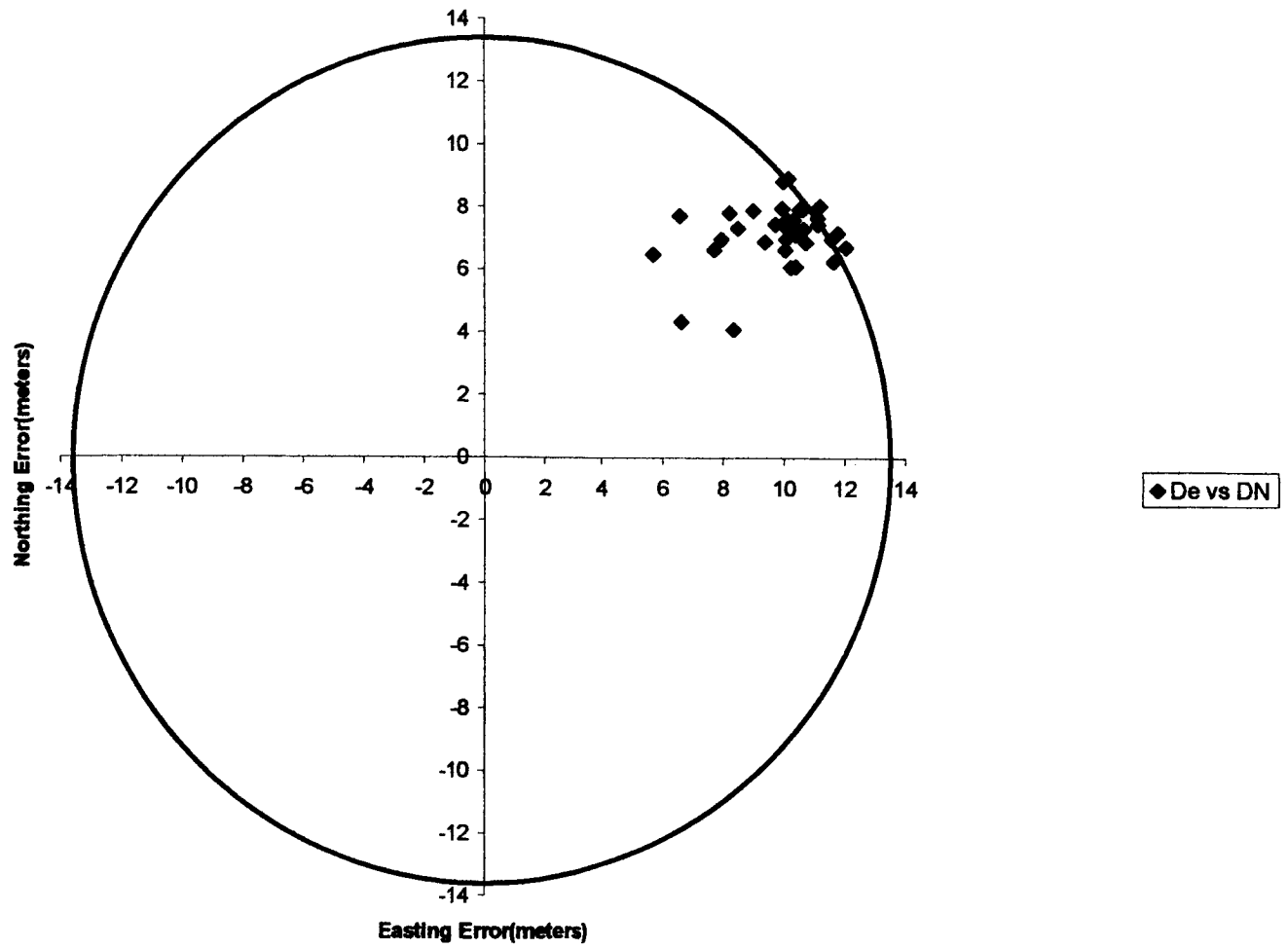
Quickbird Multispectral band Geolocation Errors for Brookings, SD 09-15-2003
Errors Scaled 100x



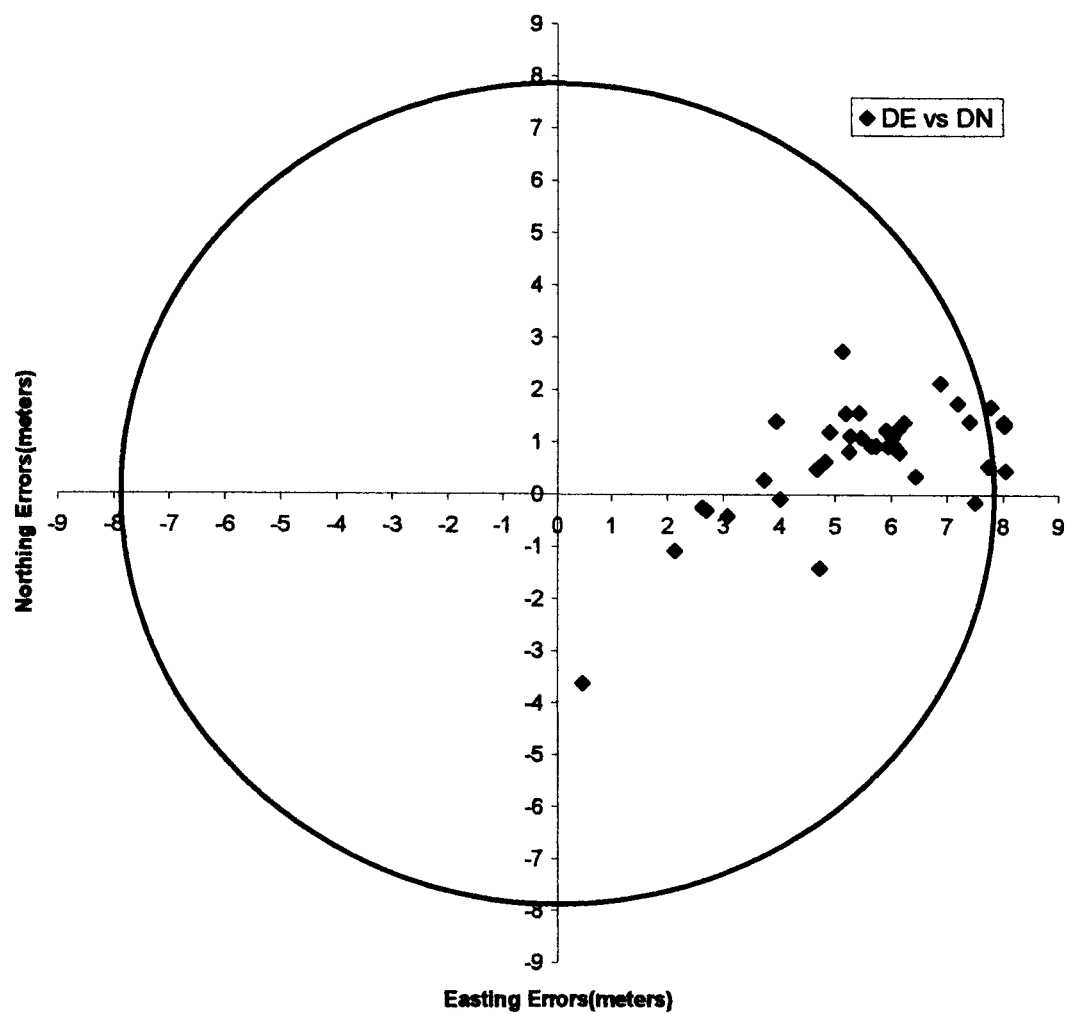
Oct 21, 2003 Quickbird Panchromatic Band(CE90%=13.62)



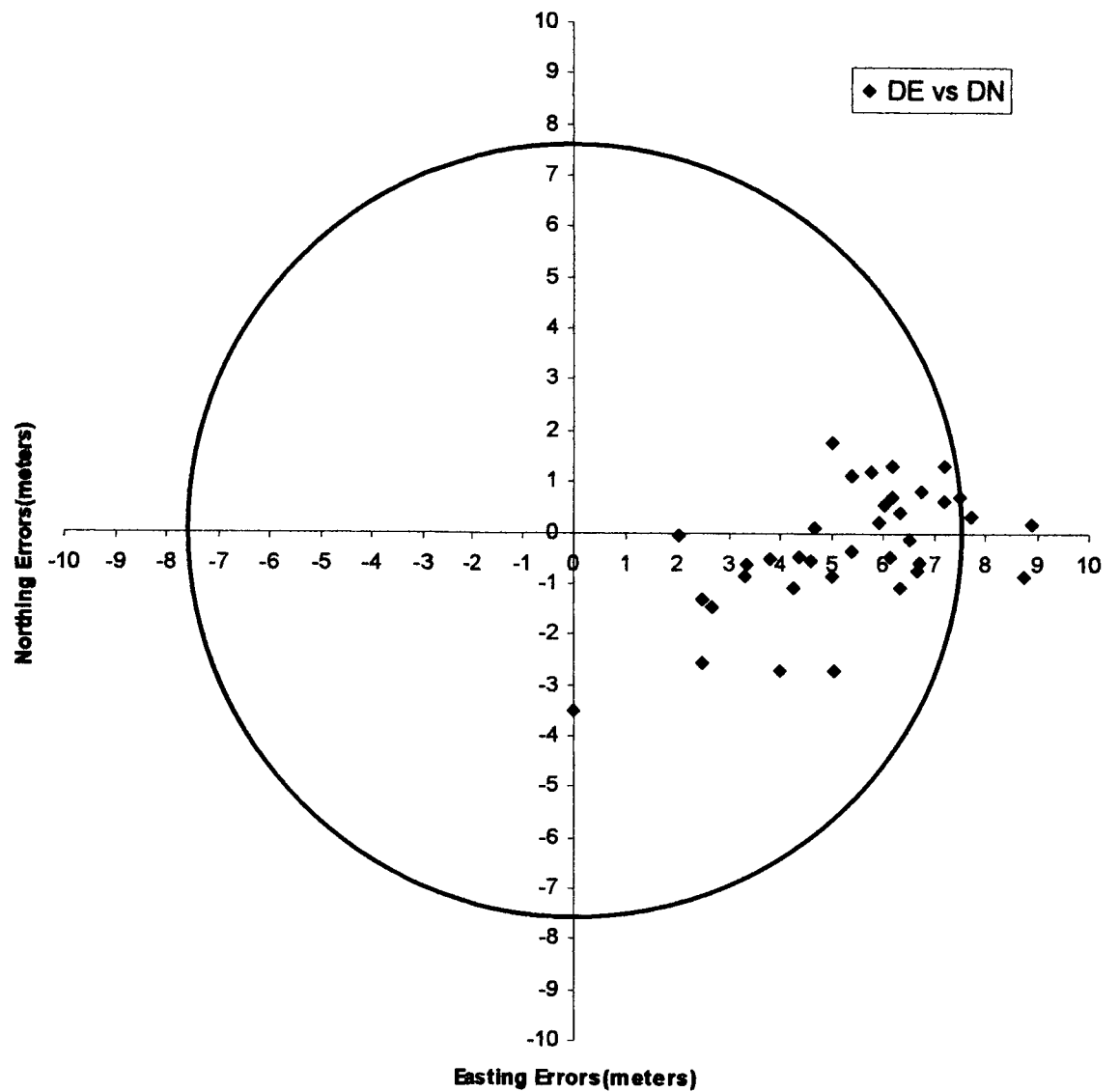
Oct21, 2003_Multispectral Band_Quickbird(CE90%=13.75)



Aug 23, 2003 Quickbird Pan band (Orthorectified Product CE90%=7.97m)



Aug 23, 2003 QUICKBIRD Multispectral Band(Orthorectified Product CE90%=7.54m



Appendix 3

August 23 2003(Quickbird-Full Scene) Pan Band

Cory	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN²	DE (m)	DE²	ERROR (m)
A	4913571.96	670608.84	4913680.6880	670617.2450	8.7280	76.1780	8.4050	70.6440	12.1170	
1	4906616.72	673798.68	4906624.9500	673806.0370	8.2300	67.7329	8.1570	66.5366	11.5975	
2	4907662.32	674916.6	4907671.7370	674923.5840	9.4170	88.6799	8.9840	48.7763	11.7242	
4	4913646.48	673576.44	4913654.0740	673587.6500	7.5840	67.6888	11.2100	125.6641	13.5400	
5	4912007.88	673072.44	4912017.8540	673080.8540	9.9740	99.4807	8.4140	70.7954	13.0490	
6	4908960.16	673125.84	4908969.0920	673133.7880	8.9320	79.7806	7.9480	63.1707	11.9662	
7	4913604.36	671427.84	4913613.2490	671436.8980	8.8890	79.0143	9.0580	82.0474	12.6910	
8	4913619.48	672496.56	4913629.8130	672504.7780	10.3330	106.7709	8.2160	67.5027	13.2013	
9	4913682.00	675209.4	4913690.6320	675218.4980	8.6320	74.5114	9.0980	82.7736	12.5413	
10	4913693.28	677374.44	4913703.0680	677383.1140	9.7680	96.7688	8.6740	75.2363	13.0769	
11	4913775.96	679464.24	4913785.4200	679472.2870	9.4600	89.4916	8.0470	64.7542	12.4196	
13	4912177.56	679526.6400	4912184.6760	679536.0540	7.1150	50.6232	8.4140	70.7954	11.0190	
14	4912413.48	676308.84	4912423.0660	676312.3620	9.5760	91.6888	3.5220	12.4046	10.2031	
15	4911095.16	674711.64	4911104.7910	674719.1890	9.6310	92.7562	7.5490	56.9874	12.2370	
16	4911989.76	671769.84	4911989.9140	671777.1910	9.1540	83.7967	7.3510	54.0372	11.7402	
17	4910362.56	671482.44	4910371.4420	671492.0880	8.8820	78.8889	9.5490	93.0839	13.1139	
18	4909998.00	673110.6	4910007.0220	673118.3490	9.0220	81.3685	7.7450	59.9850	11.8904	
19	4910687.92	676321.2	4910696.8770	676329.8540	8.9670	80.2278	8.4540	71.4701	12.3186	
20	4910568.76	678205.24	4910568.3530	678253.9080	9.5830	92.0266	8.6680	75.1342	12.9280	
22	4909805.64	680489.76	4909816.5380	680496.0740	10.8860	118.7228	6.3140	39.6666	12.5932	
23	4909244.40	679426.80	4909253.6320	679434.5430	9.2320	85.2288	7.7430	59.9540	12.0492	
24	4908662.00	677963.4	4908671.1460	677971.2400	9.1460	83.6493	7.8400	61.4656	12.0464	
25	4908264.80	676871	4908273.3600	676878.3330	8.5600	73.2736	7.3390	53.7729	11.2715	
26	4908422.80	675285	4908431.8880	675292.6180	9.0850	82.5372	7.8180	58.0339	11.8563	
27	4908741.96	671489.64	4908749.9630	671497.6050	8.0230	64.3686	7.9650	63.4412	11.3063	
29	4907282.40	675787.92	4907291.5890	675794.7790	9.1650	83.9972	6.9590	47.0459	11.4474	
30	4907588.60	676719	4907607.4070	676727.0600	8.8070	77.5632	8.0600	64.9636	11.9385	
31	4907363.8000	677248.2000	4907382.9860	677255.0560	9.1860	84.3642	6.8560	47.0047	11.4616	
34	4906323.00	675413.4	4906330.5410	675421.1710	7.5410	56.8667	7.7710	60.3684	10.8284	
35	4905749.40	673840.2	4905758.1030	673846.8300	8.7030	75.7422	6.6300	43.9689	10.9407	
37	4903735.20	675169.2	4903740.2630	675175.2780	5.0630	25.6340	6.0780	36.9421	7.9105	
38	4903459.20	676534.8	4903467.3170	676538.8920	8.1170	65.8657	3.8920	15.1477	9.0019	
39	4904811.00	677867.4	4904820.6200	677871.8910	9.5200	90.6304	4.4910	20.1691	10.5261	
40	4904116.80	679741.2	4904125.6380	679746.6720	8.8380	78.1102	5.4720	29.9426	10.3949	
41	4904092.68	678981.36	4904100.1270	678987.8570	7.4470	55.4578	6.4970	42.2110	9.8828	
42	4903651.60	674554.2	4903658.9760	674560.5400	7.2760	52.9402	6.3400	40.1966	9.6507	
43	4905613.00	671241.60	4905619.4870	671247.5310	6.4870	42.0812	5.9310	35.1768	8.7886	
44	4907161.80	673182	4907169.7480	673188.1460	7.9480	63.1866	6.1460	37.7733	10.0479	
45	4907199.80	679630.8	4907208.9570	679636.8690	9.3570	87.5634	6.0890	36.8328	11.1529	
46	4908396.96	678222.24	4908405.2040	678230.2050	8.2440	67.9636	7.9850	63.4412	11.4632	
47	4906975.80	678038.4	4906983.9870	678045.6440	8.1870	67.0270	7.2440	52.4756	10.9317	
48	4906871.00	676411.2	4906880.3030	676417.6820	9.3030	86.5468	6.4820	42.0163	11.3385	
49	4907087.00	670571.4	4907105.4480	670579.1620	8.4480	71.3866	7.7620	60.2486	11.4732	
50	4903866.20	673279.2	4903873.2300	673284.6980	7.0300	49.4209	5.4980	30.2280	8.9246	
51	4905890.00	679683.6	4905898.8920	679689.9530	8.6820	75.5809	6.3530	40.3806	10.7862	
52	4903926.00	671862.8	4903933.4440	671869.1700	7.4440	55.4131	6.3700	40.5769	9.7975	
54	4908514.20	674756.20	4908521.615	674762.496	7.4150	54.9822	7.2960	53.2316	10.4026	
57	4904048.00	678119.40	4904055.16	678123.496	9.1900	83.7225	4.0960	16.7772	10.0280	
63	4909118.40	674742.80	4909123.8	674742.003	5.4000	29.1600	-0.5970	0.3564	5.4329	
64	4906634.60	677301.20	4906660.771	677301.612	16.1710	261.6012	0.4120	0.1697	16.1762	
65	4913674.80	674662.80	4913683.126	674672.483	8.3260	69.3223	9.8830	93.7605	12.7704	
67	4908836.00	674724.80	4908844.201	674732.306	9.2010	84.6684	7.7260	59.6911	12.0146	
69	4912532.40	676310.40	4912541.925	676314.982	9.5250	90.7256	4.5920	21.0865	10.5741	
90	4904205.80	682957.80	4904212.063	682963.948	6.4630	41.7704	6.1480	37.7979	8.9201	
91	4906326.00	682888.80	4906331.883	682896.4	5.8830	34.6087	6.6000	43.5800	8.8414	
94	4912233.60	682726.00	4912245.374	682733.182	11.7740	138.6271	5.1820	26.6531	12.8638	

MEAN ERROR (m)	6.6867	6.6878	11.2708
STD. DEV	1.6081	2.0191	1.6805
RMSE (m)		8.8405	7.2924
90% CIRCULAR ERROR			11.4601
			4.3236

August 23 2003(Quickbird-Full Scene) Multispectral bands

Cory POINT	MTG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
A	4913574.00	670609.20	4913580.6880	670617.2450	6.6880	44.7293	8.0450	64.7220	10.4619
1	4908516.60	673799.40	4908524.9500	673806.8370	8.3500	69.7225	7.4370	55.3090	11.1817
2	4907864.00	674916.00	4907871.7370	674923.5840	7.7370	59.8612	7.5840	57.5171	10.8341
4	4913647.20	673576.80	4913654.0740	673587.6500	6.8740	47.2519	10.6500	117.7225	12.8442
5	4912008.00	673072.80	4912017.8540	673080.8540	9.8540	97.1013	8.0540	64.8669	12.7267
6	4908950.40	673125.60	4908959.0920	673133.7880	8.6920	75.5509	8.1880	67.0433	11.9413
7	4913606.40	671428.80	4913613.2490	671436.8980	6.8490	46.9088	8.0960	65.5776	10.6060
8	4913623.20	672496.80	4913629.8130	672504.7760	6.6130	43.7318	7.9760	63.6166	10.3609
9	4913683.20	675211.20	4913690.6320	675218.4980	7.4320	55.2346	7.2980	53.2608	10.4161
10	4913695.20	677373.60	4913703.0660	677383.1140	7.8660	61.8740	9.5140	90.5162	12.3446
11	4913776.80	679461.60	4913785.4200	679472.2870	8.6200	74.3044	10.6870	114.2120	13.7301
13	4912176.00	679526.40	4912184.6750	679535.0540	8.6750	75.2556	8.6540	74.8917	12.2535
14	4912413.60	676303.20	4912423.0560	676312.3620	9.4560	89.4159	9.1620	83.9422	13.1666
15	4911096.00	674709.60	4911104.7910	674719.1890	8.7910	77.2817	9.5890	91.9489	13.0089
16	4911993.60	671769.60	4911998.9140	671777.1910	5.3140	28.2386	7.5910	57.6233	9.2662
17	4910364.00	671481.60	4910371.4420	671492.0880	7.4420	55.3834	10.4880	109.9981	12.6601
18	4909999.20	673108.80	4910007.0220	673118.3450	7.8220	61.1837	9.5450	91.1070	12.3406
19	4910589.60	676320.00	4910596.8770	676329.6540	7.2770	52.9547	9.6540	93.1997	12.0894
20	4910560.80	678288.00	4910568.3530	678293.9080	7.5530	57.0478	5.9060	34.9045	9.5892
22	4909509.60	680488.80	4909516.5360	680496.0740	6.9360	48.1081	7.2740	52.9111	10.0508
23	4909245.60	679426.80	4909253.6320	679434.5430	8.0320	64.5130	7.7430	59.9540	11.1565
24	4909661.40	677953.40	4909671.1460	677971.2400	9.7460	94.9845	7.8400	61.4656	12.5080
25	4909267.20	676688.00	4909273.3600	676678.3330	6.1600	37.9456	10.3330	106.7709	12.0298
26	4908422.60	675285.00	4908431.6850	675292.6180	9.0850	82.5372	7.6180	58.0308	11.8563
27	4908744.00	671488.80	4908749.9830	671497.6050	5.9830	35.7963	8.8050	77.5280	10.6454
29	4907285.40	675769.60	4907291.5650	675794.7790	6.1660	38.0072	5.1790	26.8220	8.0517
30	4907601.60	676718.40	4907607.4070	676727.0600	5.8070	33.7212	8.6600	74.9956	10.4267
31	4907385.60	677248.80	4907392.9850	677255.0560	7.3850	54.5382	6.2580	39.1375	9.6786
34	4906324.80	675412.80	4906330.5410	675421.1710	5.7410	32.9591	8.3710	70.0736	10.1505
35	4906751.20	673840.80	4906758.1030	673846.8300	6.9030	47.6514	6.0300	36.3609	9.1659
37	4903735.20	675170.40	4903740.2530	675175.2780	5.0630	25.6340	4.8780	23.7949	7.0306
38	4903461.60	676533.60	4903467.3170	676538.6920	5.7170	32.6841	5.0920	25.9285	7.6559
39	4904812.80	677888.00	4904820.6200	677871.8910	7.7200	59.5984	3.8910	15.1399	8.6461
40	4904119.20	679740.00	4904125.6380	679746.6720	6.4380	41.4478	6.6720	44.5156	9.2716
41	4904092.60	678881.60	4904100.1270	678887.8570	7.3270	53.6849	6.2570	39.1500	9.6351
42	4905352.80	674556.00	4905359.8760	674560.5400	6.0760	36.9178	4.5400	20.6116	7.5848
43	4905613.60	671244.00	4905619.4870	671247.5310	5.8870	34.6568	3.5310	12.4680	6.8647
44	4907162.40	673180.80	4907169.7490	673188.1460	7.3490	54.0078	7.3460	53.9637	10.3909
45	4907200.80	679629.60	4907208.9570	679636.8690	8.1570	66.5366	7.2690	52.8384	10.9259
46	4908398.40	678220.80	4908405.2040	678230.2060	6.8040	46.2944	9.4050	88.4540	11.6081
47	4906975.20	678040.80	4906983.9870	678045.6440	8.7870	77.2114	4.8440	23.4543	10.0337
48	4906670.80	676411.40	4906680.3030	676417.6820	9.5030	90.3070	8.2820	39.4635	11.3917
49	4907098.20	670572.00	4907105.4490	670579.1620	7.2490	52.5480	7.1620	51.2942	10.1903
50	4903968.00	673279.20	4903973.2300	673284.6980	5.2300	27.3529	5.4980	30.2280	7.5882
51	4905691.20	679684.80	4905698.6920	679689.9530	7.4920	56.1301	5.1530	26.5534	9.0930
52	4903927.20	671664.00	4903933.4440	671669.1700	6.2440	38.9875	5.1700	26.7289	8.1066
54	4908511.20	674755.20	4908521.615	674762.496	10.4150	108.4722	7.2960	53.2316	12.7163
57	4904047.20	678117.60	4904055.15	678123.496	7.9500	63.2025	5.8960	34.7628	9.8977
63	4909113.60	674733.60	4909123.8	674742.003	10.2000	104.0400	8.4030	70.6104	13.2165
64	4906646.20	677302.80	4906650.771	677301.612	4.5710	20.8940	-1.1880	1.4113	4.7229
65	4913673.60	674664.00	4913683.126	674672.483	9.5260	90.7447	8.4830	71.9613	12.7556
67	4909960.80	674726.40	4909944.201	674732.326	-16.5890	275.5268	5.9260	35.1175	17.6251
69	4912533.60	676305.60	4912541.925	676314.992	8.3250	69.3056	9.3920	88.2097	12.5505
90	4904205.60	682958.40	4904212.063	682963.948	6.4630	41.7704	5.5480	30.7803	8.5177
91	4906320.00	682893.60	4906331.883	682895.4	11.8830	141.2057	1.8000	3.2400	12.0186
94	4912236.00	682728.00	4912245.374	682733.182	9.3740	87.8719	5.1820	26.8531	10.7110

MEAN ERROR (m)	7.1250	7.1100	10.6873
STD. DEV	3.5623	2.2397	2.1379
RMSE (m)		7.9517	7.4484
90% CIRCULAR ERROR			10.8953
			7.0483

August 23 2003(Quickbird-Full Scene) Pan band

Raw	POINT	NTMG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	A	4913673.16	670609.56	4913680.6880	670617.2450	7.5280	56.6708	7.6860	59.0592	10.7578
	1	4908516.60	673798.8	4908524.9500	673806.8370	8.3500	69.7225	8.0370	64.5934	11.5895
	2	4907662.29	674916.51	4907671.7370	674923.5840	9.4470	89.2458	7.0740	50.0415	11.8020
	4	4913646.24	673574.28	4913654.0740	673587.6500	7.8340	61.3716	13.3700	178.7569	15.4961
	5	4912008.20	673072.4	4912017.8540	673080.8540	9.6540	93.1997	8.4540	71.4701	12.8324
	6	4908949.80	673126	4908959.0920	673133.7880	9.2520	86.3413	7.7880	60.6529	12.1241
	7	4913605.68	671428.44	4913613.2490	671436.8980	7.5590	57.2898	8.4580	71.5378	11.3602
	8	4913620.32	672496.8	4913629.8130	672504.7760	9.4530	90.1170	7.9760	63.6166	12.3969
	9	4913681.70	675209.85	4913690.6320	675218.4980	8.9320	79.7806	8.6480	74.7879	12.4326
	10	4913693.85	677374.65	4913703.0660	677383.1140	9.2180	84.9347	8.4640	71.6393	12.5130
	11	4913776.80	679464	4913785.4200	679472.2870	8.5200	74.3044	8.2670	68.6744	11.9574
	13	4912175.40	679526.2800	4912184.6750	679535.0540	9.2780	86.0256	8.7740	76.9831	12.7675
	14	4912412.60	676304.6	4912423.0560	676312.3620	10.4660	109.3279	7.7620	60.2486	13.0222
	15	4911094.20	674711.9	4911104.7910	674719.1890	10.5910	112.1693	7.2690	53.1295	12.8589
	16	4911989.70	671770	4911998.9140	671777.1910	9.2140	84.8978	7.1910	51.7105	11.6880
	17	4910370.15	671482.65	4910371.4420	671492.0880	1.2920	1.6893	9.4380	89.0758	9.5260
	18	4909997.66	673110.6	4910007.0220	673118.3450	9.3620	87.6470	7.7480	59.9850	12.1504
	19	4910587.20	676321.35	4910596.8770	676329.6540	9.6770	93.6443	8.3040	68.9564	12.7515
	20	4910560.00	676285.2	4910568.3530	676293.9080	8.3530	69.7726	8.7080	75.8293	12.0666
	22	4909505.64	680490.24	4909516.5360	680496.0740	10.8960	118.7228	5.8340	34.0366	12.3695
	23	4909243.73	679428.00	4909253.6320	679434.5430	9.9020	98.0496	6.5430	42.8108	11.9685
	24	4909661.80	677963.7	4909671.1460	677971.2400	9.3460	87.3477	7.5400	56.8616	12.0083
	25	4909264.30	676670.6	4909273.3500	676678.3330	9.0600	82.0836	7.7330	59.7993	11.9115
	26	4909422.10	675285.4	4909431.6850	675292.6180	9.5850	91.8722	7.2180	52.0995	11.9868
	27	4908742.20	671489.2	4908749.9830	671497.6050	7.7830	60.5751	8.4050	70.6440	11.4551
	29	4907281.88	675787.8	4907291.5550	675794.7790	9.6950	93.7992	6.9790	48.7064	11.9376
	30	4907598.30	676719.83	4907607.4070	676727.0600	9.1070	82.9374	7.2300	52.2729	11.6280
	31	4907383.2800	677248.2000	4907392.9850	677255.0560	9.7090	94.1870	6.8560	47.0047	11.8824
	34	4906322.76	675414	4906330.5410	675421.1710	7.7810	60.5440	7.1710	51.4232	10.5815
	35	4905748.60	673840.9	4905758.1030	673846.8300	9.5030	90.3070	5.9300	35.1649	11.2014
	37	4903734.45	675168.9	4903740.2630	675175.2780	5.9130	33.7910	6.3780	40.6789	8.6296
	38	4903468.90	676634.6	4903467.3170	676638.6920	8.4170	70.8469	4.1920	17.5729	9.4031
	39	4904811.40	677885.6	4904820.5200	677871.8910	9.1200	83.1744	6.2910	39.5767	11.0793
	40	4904117.80	679740.8	4904125.6380	679746.6720	7.8380	61.4342	5.8720	34.4804	9.7936
	41	4904092.32	678980.88	4904100.1270	678987.8570	7.8070	60.9492	6.9770	48.6785	10.4703
	42	4905351.90	674554	4905358.8780	674560.5400	6.9780	48.6645	6.5400	42.7716	9.9622
	43	4905512.27	671242.13	4905519.4870	671247.5310	7.2170	52.0851	5.4010	29.1708	9.0142
	44	4907161.56	673181.04	4907169.7490	673188.1460	8.1890	67.0597	7.1060	50.4952	10.8423
	45	4907199.48	679630.32	4907208.9570	679636.8890	9.4770	89.6135	6.5490	42.8894	11.5197
	46	4906396.84	678222	4906405.2040	678230.2050	8.3640	69.9565	8.2050	67.3220	11.7166
	47	4906973.40	678038.25	4906983.9870	678045.6440	10.5870	112.0846	7.3940	54.6712	12.9134
	48	4906670.64	676411.5	4906680.3030	676417.6820	9.6630	93.3736	6.1820	38.2171	11.4713
	49	4907097.70	670572	4907105.4490	670579.1620	7.7490	60.0470	7.1620	51.2942	10.5618
	50	4903965.60	673279.2	4903973.2300	673284.6980	7.6300	58.2169	5.4900	30.2280	9.4045
	51	4905690.60	679883.6	4905698.6920	679889.9530	8.0520	65.4805	6.3530	40.3606	10.2679
	52	4903925.25	671663.55	4903933.4440	671669.1700	8.1940	67.1416	5.6200	31.5844	9.9361
	54	4906511.60	674754.60	4906521.615	674762.496	10.0150	100.3002	7.8960	62.3468	12.7533
	57	4904045.70	678117.90	4904055.15	678123.496	9.4500	89.3025	5.5960	31.3152	10.9626
	63	4909116.00	674734.40	4909123.8	674742.003	7.8000	60.8400	7.6030	57.8056	10.8925
	64	4905641.40	677296.00	4905650.771	677301.612	9.3710	87.6156	5.6120	31.4945	10.9229
	65	4913674.08	674664.12	4913683.126	674672.483	9.0460	81.8301	8.3630	69.9388	12.3195
	67	4909935.00	674724.20	4909944.201	674732.326	9.2010	84.6694	8.1260	66.0319	12.2756
	69	4912532.00	675306.40	4912541.925	675314.992	9.9250	98.5056	8.5920	73.8225	13.1274
	90	4904204.20	682958.20	4904212.063	682963.948	7.8630	61.6268	5.7480	33.0395	9.7399
	91	4906324.00	682889.10	4906331.883	682895.4	7.8630	62.1417	6.3000	39.6900	10.0912
	94	4912234.80	682726.95	4912245.374	682733.182	10.5740	111.8095	6.2320	38.6378	12.2736

MEAN ERROR (m)	8.7280	7.2978	11.4802
STD. DEV	1.4505	1.3712	1.2584
RMSE (m)		8.8456	7.4914
90% CIRCULAR ERROR			11.5916
			3.3433

August 23 2003(Quickbird-Full Scene) Multispectral band

Rawl	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	A	4913572.80	670809.33	4913580.6880	670617.2450	7.8880	62.2205	7.9150	62.6472	11.1744
	1	4908516.27	673799.73	4908524.9500	673806.8370	8.6800	75.3424	7.1070	50.5094	11.2184
	2	4907864.27	674915.73	4907871.7370	674923.5840	7.4670	55.7561	7.8540	61.6853	10.8370
	4	4913646.93	673573.07	4913654.0740	673587.6500	7.1440	51.0367	14.5800	212.5764	16.2362
	5	4912009.60	673072.53	4912017.8540	673080.8540	8.2540	68.1285	8.3240	69.2690	11.7225
	6	4908951.47	673126.13	4908959.0920	673133.7080	7.6220	58.0949	7.6580	58.6450	10.8046
	7	4913605.33	671429.33	4913613.2490	671436.8980	7.9190	62.7106	7.6680	57.2746	10.9538
	8	4913620.80	672497.33	4913629.8130	672504.7760	9.0130	81.2342	7.4460	55.4429	11.6809
	9	4913681.87	675209.60	4913690.6320	675218.4980	8.7620	76.7726	8.8980	79.1744	12.4879
	10	4913694.13	673757.73	4913703.0680	673763.1140	8.9360	79.8521	7.3640	54.5235	11.5920
	11	4913776.27	679465.33	4913785.4200	679472.2870	9.1500	83.7225	6.9570	48.3998	11.4944
	13	4912173.87	679528.27	4912184.6750	679535.0540	10.8050	116.7480	8.7840	46.0227	12.7582
	14	4912413.87	676304.27	4912423.0560	676312.3620	9.1860	84.3626	8.0820	65.4805	12.2419
	15	4911095.20	674711.47	4911104.7910	674719.1890	9.5910	91.9673	7.7190	59.5830	12.3114
	16	4911990.93	671769.60	4911998.9140	671777.1910	7.9840	63.7443	7.5910	57.6233	11.0167
	17	4910372.00	671482.93	4910371.4420	671492.0880	-0.5580	0.3114	9.1580	83.8690	9.1750
	18	4909998.67	673111.20	4910007.0220	673118.3450	8.3520	69.7559	7.1450	51.0510	10.9912
	19	4910589.07	676322.40	4910596.8770	676329.6540	7.8070	60.9492	7.2540	52.6205	10.6569
	20	4910558.13	678286.67	4910568.3530	678293.9080	10.2230	104.5097	7.2380	52.3866	12.5259
	22	4909505.87	680490.67	4909516.5360	680496.0740	10.8680	113.7636	5.4040	29.2032	11.9689
	23	4909243.73	679428.00	4909253.6320	679434.5430	9.9020	98.0496	6.5430	42.8108	11.8685
	24	4909662.13	677964.80	4909671.1460	677971.2400	9.0180	81.2883	6.4400	41.4736	11.0798
	25	4909265.33	676670.4	4909273.3600	676678.3330	8.0300	64.4809	7.9330	62.9325	11.2878
	26	4909422.13	675285.60	4909431.6850	675292.6180	9.5550	91.2980	7.0180	49.2523	11.8654
	27	4908742.93	671490.40	4908749.9830	671497.6050	7.0630	49.7448	7.2050	51.9120	10.0825
	29	4907282.67	675787.2	4907291.5650	675794.7790	8.8950	79.1210	7.5790	57.4412	11.8860
	30	4907800.27	676720.27	4907807.4070	676727.0600	7.1370	50.9368	6.7900	46.1041	9.8509
	31	4907383.2000	677248.8000	4907392.9890	677255.0550	9.7850	95.7462	6.2560	39.1375	11.6139
	34	4906323.09	675415.2	4906330.5410	675421.1710	7.4510	55.5174	5.9710	35.6628	9.5483
	35	4905749.83	673841.83	4905758.1030	673846.8300	8.2730	68.4425	5.0000	25.0000	9.6666
	37	4903734.34	675168.89	4903740.2630	675175.2780	5.9230	35.0819	5.3680	29.0305	8.0070
	38	4903459.52	676535.36	4903467.3170	676538.6920	7.7970	60.7932	3.3320	11.1022	8.4791
	39	4904811.40	677865.6	4904820.5200	677871.8910	9.1200	83.1744	6.2910	39.5767	11.0793
	40	4904117.60	679742.67	4904125.6360	679746.6720	8.0380	64.6094	4.0020	16.0180	8.9792
	41	4904093.07	678979.2	4904100.1270	678987.8570	7.0570	49.8012	8.6570	74.9436	11.1689
	42	4905352.27	674553.80	4905359.8760	674560.5400	6.8080	43.6392	6.9400	48.1636	9.9814
	43	4905512.27	671242.13	4905519.4870	671247.5310	7.2170	52.0851	5.4010	29.1708	9.0142
	44	4907162.13	673181.33	4907169.7490	673188.1460	7.6190	58.0492	6.8180	46.4579	10.2229
	45	4907199.48	679630.32	4907208.9570	679636.8890	9.4770	89.8135	6.5490	42.8894	11.5197
	46	4908396.84	678222	4908405.2040	678230.2050	8.3640	69.9565	8.2050	67.3220	11.7186
	47	4906973.40	678038.25	4906983.9870	678045.6440	10.5870	112.0846	7.3840	54.6712	12.9134
	48	4906670.74	676412.57	4906680.3030	676417.8820	9.5630	91.4510	5.1120	26.1325	10.8436
	49	4907098.40	670571.73	4907105.4490	670579.1620	7.0490	49.6884	7.4320	55.2346	10.2432
	50	4903966.97	673279.71	4903973.2300	673284.6880	6.2600	39.1876	4.9880	24.8801	8.0042
	51	4905690.86	679684.46	4905698.6920	679689.9530	7.8320	61.3402	5.4930	30.1730	9.5663
	52	4903927.20	671664.00	4903933.4440	671669.1700	6.2440	38.9875	5.1700	26.7289	8.1066
	54	4908510.40	674755.20	4908521.615	674762.496	11.2150	125.7762	7.2960	53.2316	13.3794
	57	4904046.67	678119.20	4904055.15	678123.496	8.4800	71.9104	4.2960	18.4566	9.5061
	63	4909118.53	674734.93	4909123.8	674742.003	7.2700	52.8529	7.0730	50.0273	10.1430
	64	4905541.49	677296.46	4905550.771	677301.612	9.2810	86.1370	5.1520	26.5431	10.6151
	65	4913673.87	674663.47	4913683.126	674672.483	9.2580	85.6735	9.0130	81.2342	12.9193
	67	4909995.47	674724.80	4909944.201	674732.326	8.7310	76.2304	7.5260	56.6407	11.5270
	69	4912532.80	676306.40	4912541.925	676314.992	9.1250	83.2656	8.5920	73.8225	12.5335
	90	4904204.80	682959.73	4904212.063	682963.948	7.2630	52.7512	4.2180	17.7915	8.3990
	91	4906324.11	682890.17	4906331.883	682895.4	7.7730	60.4195	5.2300	27.3529	9.3687
	94	4912236.00	682726.93	4912245.374	682733.182	9.3740	87.8719	6.2520	39.0875	11.2676

MEAN ERROR (m)	8.2591	6.9041	10.9195
STD. DEV	1.6969	1.6900	1.5228
RMSE (m)		8.4286	7.1043
90% CIRCULAR ERROR			11.0233
			4.0115

August 23 2003(Quickbird-Full Scene) Pan band

Tim	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
A	4913672.80	670809.2	4913680.6880	670617.2450	7.8880	62.2205	8.0460	64.7220	11.2669	
1	4908516.60	673798.8	4908524.9500	673806.8570	8.3500	69.7225	8.0370	64.5934	11.5895	
2	4907662.80	674916	4907671.7370	674923.5840	8.9370	79.8700	7.5840	57.5171	11.7212	
4	4913646.60	673575.6	4913654.0740	673687.6500	7.4740	55.8607	12.0500	145.2025	14.1797	
5	4912008.60	673072.8	4912017.6540	673080.8540	9.2540	85.6365	8.0540	64.8669	12.2680	
6	4906949.80	673125.6	4906959.0920	673133.7880	9.2920	86.3413	8.1980	67.0433	12.3849	
7	4913604.00	671428.2	4913613.2490	671436.8980	9.2490	85.5440	8.6980	75.6552	12.6964	
8	4913620.80	672496.2	4913629.8130	672504.7760	9.0130	81.2342	8.5780	73.5478	12.4411	
9	4913681.40	675208.8	4913690.6320	675218.4980	9.2320	85.2298	9.6980	94.0512	13.3896	
10	4913694.00	677374.2	4913703.0660	677383.1140	9.0660	82.1924	8.9140	79.4594	12.7142	
11	4913776.20	679464	4913785.4200	679472.2870	9.2200	85.0084	8.2870	68.6744	12.3969	
13	4912176.60	679526.4000	4912184.6750	679535.0540	8.0750	65.2056	8.6540	74.8917	11.6363	
14	4912413.00	676303.8	4912423.0560	676312.3620	10.0560	101.1231	8.5620	73.3078	13.2072	
15	4911094.80	674711.4	4911104.7910	674719.1890	9.9910	99.8201	7.7890	60.6686	12.6684	
16	4911988.80	671769.6	4911998.9140	671777.1910	10.1140	102.2930	7.5910	57.6233	12.6468	
17	4910370.60	671482.8	4910371.4420	671492.0880	0.8420	0.7090	9.2980	86.2669	9.3261	
18	4909997.40	673110.6	4910007.0220	673118.3450	9.6220	92.5829	7.7450	59.9880	12.3518	
19	4910587.80	676321.2	4910596.8770	676329.6540	9.0770	82.3919	8.4540	71.4701	12.4041	
20	4910588.40	678285.6	4910588.3530	678293.9080	9.9530	99.0622	8.3080	69.0229	12.9648	
22	4909506.60	680489.4	4909516.5360	680496.0740	9.9360	98.7241	6.6740	44.5423	11.9694	
23	4909245.00	679426.80	4909253.6320	679434.5430	8.6320	74.5114	7.7430	59.9540	11.5969	
24	4909662.0000	677963.4	4909671.1480	677971.2400	9.1460	83.6493	7.8400	61.4686	12.0464	
25	4909264.80	676670.4	4909273.3600	676678.3330	8.5600	73.2736	7.9330	62.9325	11.6707	
26	4909422.00	675285	4909431.6860	675292.6180	9.6860	93.7992	7.6180	58.0339	12.3221	
27	4908742.20	671489.4	4908749.9830	671497.6050	7.7630	60.5751	8.2050	67.3220	11.3092	
29	4907282.40	675787.8	4907291.5660	675794.7790	9.1650	83.9972	6.9790	48.7064	11.5197	
30	4907598.60	676719.6	4907607.4070	676727.0600	8.8070	77.5632	7.4800	55.6516	11.5419	
31	4907383.2000	677247.6000	4907392.9860	677255.0560	9.7650	95.7462	7.4560	55.5919	12.3020	
34	4906323.00	675413.4	4906330.5410	675421.1710	7.5410	56.8667	7.7710	60.3884	10.8284	
35	4905748.80	673840.8	4905758.1030	673846.8300	9.3330	86.5468	6.0300	36.3609	11.0863	
37	4903733.40	675169.2	4903740.2630	675175.2780	6.8630	47.1008	6.0780	36.9421	9.1675	
38	4903458.60	676534.2	4903467.3170	676538.6920	8.7170	75.9861	4.4920	20.1781	9.8063	
39	4904812.20	677865	4904820.5200	677871.8910	8.3200	69.2224	6.8910	47.4859	10.8032	
40	4904117.40	679741.2	4904125.6360	679746.6720	8.2380	67.8646	5.4720	29.9426	9.8898	
41	4904082.80	678981.6	4904100.1270	678987.8570	7.3270	53.6849	6.2570	39.1500	9.6361	
42	4905351.60	674554.2	4905358.8760	674560.5400	7.2760	52.9402	6.3400	40.1956	9.6507	
43	4905512.40	671241.00	4905519.4870	671247.5310	7.0870	50.2256	6.5310	42.6540	9.6374	
44	4907162.40	673180.8	4907169.7490	673188.1460	7.3490	54.0078	7.3460	53.9537	10.3909	
45	4907199.60	679630.8	4907208.9570	679636.8690	9.3570	87.5634	6.0690	36.8326	11.1529	
46	4906397.20	678222	4906405.2040	678230.2050	8.0040	64.0540	8.2050	67.3220	11.4624	
47	4906974.60	678038.4	4906983.9870	678045.6440	9.3870	88.1158	7.2440	52.4755	11.6571	
48	4906672.80	676411.2	4906680.3030	676417.6820	7.6030	56.2950	6.4820	42.0163	9.9152	
49	4907097.60	670571.4	4907105.4490	670579.1620	7.8490	61.6068	7.7620	60.2486	11.0388	
50	4903965.60	673279.2	4903973.2300	673284.6980	7.6300	58.2189	5.4980	30.2280	9.4045	
51	4906680.00	679683.6	4906688.6920	679689.9530	8.8820	75.5609	6.3530	40.3606	10.7862	
52	4903925.40	671663.4	4903933.4440	671669.1700	8.0440	64.7059	5.7700	33.2929	9.8994	
54	4908513.00	674754.60	4908521.615	674762.496	8.6150	74.2182	7.8960	62.3468	11.6861	
57	4904046.60	678118.80	4904055.15	678123.496	8.6600	73.1025	4.6960	22.0524	9.7547	
63	4909114.80	674731.20	4909123.6	674742.003	9.0000	81.0000	10.8030	116.7048	14.0608	
64	4905646.80	677301.60	4905650.771	677301.612	3.9710	15.7688	0.0120	0.0001	3.9710	
65	4913673.60	674663.40	4913683.126	674672.483	9.5260	90.7447	9.0830	82.5009	13.1623	
67	4909935.00	674724.60	4909944.201	674732.326	9.2010	84.8584	7.7260	59.6911	12.0146	
69	4912533.60	676306.20	4912541.925	676314.992	8.3250	69.3056	8.7920	77.2993	12.1081	
90	4904203.80	682958.40	4904212.063	682963.948	8.2630	68.2772	5.5480	30.7803	9.9528	
91	4906324.20	682888.80	4906331.883	682895.4	7.6830	59.0285	6.6000	43.5600	10.1286	
94	4912234.80	682727.40	4912245.374	682733.182	10.5740	111.8095	5.7820	33.4315	12.0516	

MEAN ERROR (m)	8.4714	7.3921	11.3574
STD. DEV	1.4886	1.7117	1.6960
RMSE (m)		8.6006	7.6850
90% CIRCULAR ERROR			3.8107

August 23 2003(Quickbird-Full Scene) Multispectral bands

POINT	NTMG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
A	4913572.80	670608	4913580.6880	670617.2450	7.8880	62.2205 ⁺	9.2450	85.4700	12.1528
1	4908618.40	673797.6	4908624.9500	673806.8370	6.5500	42.9025 ⁺	9.2370	85.3222	11.3236
2	4907664.00	674916	4907671.7370	674923.5840	7.7370	59.8612 ⁺	7.5840	57.5171	10.8341
4	4913647.20	673579.2	4913654.0740	673587.6600	6.8740	47.2519 ⁺	8.4500	71.4025	10.8929
5	4912010.40	673075.2	4912017.8540	673080.8540	7.4540	55.5621 ⁺	5.6540	31.9677	9.3557
6	4908950.40	673125.6	4908959.0920	673133.7880	8.6920	75.5609 ⁺	8.1880	67.0433	11.9413
7	4913606.40	671428.8	4913613.2490	671436.8980	6.8490	46.9088 ⁺	8.0980	65.5776	10.6060
8	4913620.80	672496.8	4913629.8130	672504.7760	9.0130	81.2342 ⁺	7.9780	63.6166	12.0354
9	4913680.80	675211.2	4913690.6320	675218.4980	9.8320	96.6682 ⁺	7.2980	53.2608	12.2446
10	4913695.20	677373.6	4913703.0860	677383.1140	7.8660	61.8740 ⁺	9.5140	90.5162	12.3446
11	4913774.40	679464	4913785.4200	679472.2870	11.0200	121.4404 ⁺	8.2870	68.6744	13.7882
13	4912173.60	679526.4000	4912184.6750	679535.0540	11.0750	122.6556 ⁺	8.6540	74.8917	14.0552
14	4912413.60	676303.2	4912423.0580	676312.3620	9.4560	89.4159 ⁺	9.1620	83.9422	13.1666
15	4911093.60	674716.8	4911104.7910	674719.1890	11.1910	125.2365 ⁺	2.3690	5.7073	11.4432
16	4911991.20	671767.2	4911998.9140	671777.1910	7.7140	59.5058 ⁺	9.9910	99.8201	12.6224
17	4910364.00	671481.6	4910371.4420	671492.0880	7.4420	55.3634 ⁺	10.4880	109.9981	12.8601
18	4909999.20	673108.8	4910007.0220	673118.3450	7.8220	61.1837 ⁺	9.5450	91.1070	12.3406
19	4910589.80	676322.4	4910596.8770	676329.6540	7.2770	52.9547 ⁺	7.2540	52.6205	10.2750
20	4910560.80	678285.6	4910568.3630	678293.9080	7.5530	57.0478 ⁺	8.3080	69.0229	11.2281
22	4909507.20	680488.8	4909516.6360	680486.0740	9.3360	87.1609 ⁺	7.2740	52.9111	11.8352
23	4909245.60	679425.60	4909253.6320	679434.5430	9.0320	64.5130 ⁺	8.9430	79.9772	12.0204
24	4909663.20	677964	4909671.1460	677971.2400	7.9480	63.1399 ⁺	7.2400	52.4176	10.7497
25	4909267.20	678688	4909273.3600	678687.3330	6.1600	37.9456 ⁺	10.3330	106.7709	12.0298
26	4909423.20	675285.6	4909431.6860	675292.6180	8.4860	71.9952 ⁺	7.0180	49.2523	11.0112
27	4908741.60	671488.8	4908749.9630	671497.6050	8.3630	70.2747 ⁺	8.8050	77.5280	12.1574
29	4907284.80	675277.2	4907291.5950	675279.7790	6.7650	45.7652 ⁺	7.5790	57.4412	10.1591
30	4907599.20	676718.4	4907607.4070	676727.0600	8.2070	67.3548 ⁺	8.6600	74.9956	11.9311
31	4907385.6000	677260.8000	4907392.9850	677255.0560	7.3860	54.5382 ⁺	-5.7440	32.9935	9.3568
34	4906324.80	675415.2	4906330.5410	675421.1710	5.7410	32.9591 ⁺	5.9710	35.6528	8.2832
35	4905751.20	673840.8	4905759.1030	673846.8300	6.9030	47.6514 ⁺	6.0300	36.3609	9.1658
37	4903732.80	675188	4903740.2630	675175.2780	7.4630	55.8964 ⁺	7.2780	52.9693	10.4243
38	4903459.20	676533.6	4903467.3170	676539.6920	8.1170	65.8857 ⁺	5.0920	25.9265	9.5820
39	4904815.20	677865.6	4904820.5200	677871.8910	5.3200	28.3024 ⁺	6.2910	39.5767	8.2368
40	4904133.80	679740	4904125.6380	679746.8720	-7.9620	63.3934 ⁺	6.6720	44.5156	10.3879
41	4904095.20	678981.6	4904100.1270	678987.8570	4.9270	24.2753 ⁺	6.2570	39.1500	7.8640
42	4905352.80	674553.6	4905358.8760	674560.5400	6.0760	36.9178 ⁺	6.9400	48.1636	9.2240
43	4905513.60	671244.00	4905519.4870	671247.5310	5.8870	34.6588 ⁺	3.5310	12.4880	6.8647
44	4907162.40	673180.8	4907169.7490	673188.1460	7.3490	54.0078 ⁺	7.3460	53.9637	10.3909
45	4907200.80	679629.6	4907208.9570	679636.8890	8.1570	66.5366 ⁺	7.2690	52.8384	10.9259
46	4906398.40	678225.6	4906405.2040	678230.2050	6.8040	46.2944 ⁺	4.6050	21.2060	8.2159
47	4906877.80	678038.4	4906883.9870	678045.6440	6.3870	40.7938 ⁺	7.2440	52.4755	9.6576
48	4906672.80	676411.2	4906680.3030	676417.8820	7.5030	56.2950 ⁺	6.4820	42.0163	9.9152
49	4907097.80	670569.6	4907105.4490	670579.1620	7.8490	61.8068 ⁺	9.5620	91.4318	12.3709
50	4903965.80	673279.2	4903973.2300	673284.6980	7.6300	58.2169 ⁺	5.4980	30.2280	9.4045
51	4905691.20	679684.8	4905698.6920	679689.9530	7.4920	55.1301 ⁺	5.1530	26.5534	9.0930
52	4903927.20	671661.6	4903933.4440	671668.1700	6.2440	38.9875 ⁺	7.5700	57.3049	9.8129
54	4906511.20	674755.20	4906521.615	674762.496	10.4150	108.4722 ⁺	7.2960	53.2316	12.7163
57	4904047.20	678117.60	4904055.15	678123.496	7.9500	63.2025 ⁺	5.8960	34.7628	9.8977
63	4909116.00	674740.80	4909123.8	674742.003	7.8000	60.8400 ⁺	1.2030	1.4472	7.8922
64	4909636.00	677301.60	4909650.771	677301.612	14.7710	218.1824 ⁺	0.0120	0.0001	14.7710
65	4913673.60	674664.00	4913683.126	674672.483	9.5260	90.7447 ⁺	8.4830	71.9613	12.7586
67	4909939.20	674733.60	4909944.201	674732.326	5.0010	25.0100 ⁺	-1.2740	1.6231	5.1607
69	4912533.60	676305.60	4912541.925	676314.992	8.3250	69.3058 ⁺	9.3920	88.2087	12.5605
90	4904205.80	682958.40	4904212.063	682963.948	6.4630	41.7704 ⁺	5.5480	30.7803	8.5177
91	4906324.80	682888.80	4906331.883	682896.4	7.0830	50.1689 ⁺	6.6000	43.5600	9.5814
94	4912236.00	682725.60	4912245.374	682733.182	9.3740	87.8719 ⁺	7.5820	57.4867	12.0565

MEAN ERROR (m)	7.5821	6.8028	10.7622
STD. DEV	2.7047	2.9109	1.8742
RMSE (m)		8.0420	7.3892
90% CIRCULAR ERROR			10.9213
			6.6557

Sept 15, 2003(Quickbird-Full Scene) Pan band

Cory	POINT	WTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	1	4908516.00	673793.4	4908524.9500	673806.8370	8.9500	80.1025	13.4370	180.5530	16.1448
	2	4907662.20	674910	4907671.7370	674923.5840	9.5370	90.9544	13.5840	184.5251	16.5976
	4	4913644.80	673575	4913654.0740	673587.6500	9.2740	86.0071	12.6500	160.0225	15.6853
	5	4912009.20	673066.8	4912017.8540	673080.8540	8.6540	74.8917	14.0540	197.5149	16.5047
	6	4908950.40	673119	4908959.0920	673133.7880	8.6820	75.5609	14.7880	218.6849	17.1533
	9	4913682.00	675204	4913690.6320	675218.4980	8.6320	74.5114	14.4980	210.1920	16.8732
	10	4913694.60	677368.8	4913703.0660	677383.1140	8.4680	71.6732	14.3140	204.8906	16.6302
	14	4912413.00	676299	4912423.0560	676312.3620	10.0560	101.1231	13.3620	178.5430	16.7232
	15	4911095.40	674704.8	4911104.7910	674719.1890	9.3910	88.1909	14.3890	207.0433	17.1824
	18	4909998.60	673103.4	4910007.0220	673116.3450	8.4220	70.9301	14.9450	223.3530	17.1547
	19	4910587.80	676315.8	4910596.8770	676329.6540	9.0770	82.3919	13.8540	191.9333	16.5828
	20	4910580.20	678279	4910588.3530	678293.9080	8.1530	66.4714	14.9080	222.2485	16.9918
	23	4909245.60	679420.20	4909253.6320	679434.5430	8.0320	64.5130	14.3430	205.7216	16.4388
	24	4909662.00	677956.8	4909671.1460	677971.2400	9.1460	83.6493	14.4400	208.5136	17.0928
	25	4909264.80	676663.8	4909273.3600	676678.3330	8.5600	73.2736	14.5330	211.2081	16.8566
	26	4909423.20	675278.4	4909431.6850	675292.6180	8.4850	71.9952	14.2180	202.1515	16.5574
	29	4907282.40	675780.6	4907291.5650	675794.7790	9.1650	83.9972	14.1790	201.0440	16.8632
	30	4907598.00	676713	4907607.4070	676727.0600	9.4070	88.4916	14.0600	197.6836	16.9167
	31	4907383.8000	677241.0000	4907392.9650	677255.0560	9.1850	84.3642	14.0560	197.5711	16.7909
	34	4906321.80	675407.4	4906330.5410	675421.1710	8.7410	76.4051	13.7710	189.6404	16.3108
	35	4905748.20	673833	4905758.1030	673846.8300	9.9030	98.0694	13.8300	191.2688	17.0098
	37	4903731.60	675163.2	4903740.2630	675175.2780	8.6630	75.0476	12.0780	145.8781	14.8636
	38	4903458.60	676526.2	4903467.3170	676538.6820	8.7170	75.9861	13.4920	182.0341	16.0630
	39	4904811.00	677957.2	4904820.5200	677971.8910	9.5200	90.6304	14.8910	215.8255	17.5059
	41	4904090.40	678975	4904100.1270	678987.8570	9.7270	94.6145	12.8570	165.3024	16.1219
	42	4905351.00	674547	4905358.8780	674560.5400	7.8780	62.0314	13.5400	183.3316	15.6641
	44	4907161.80	673174.2	4907169.7490	673188.1460	7.9490	63.1866	13.9460	194.4909	16.0523
	46	4908396.00	678216	4908405.2040	678230.2050	9.2040	84.7136	14.2050	201.7820	16.9262
	48	4906671.00	676402.8	4906680.3030	676417.6820	9.3030	86.5458	14.8820	221.4739	17.5505
	50	4903964.40	673272	4903973.2300	673284.6980	8.8300	77.9689	12.6980	161.2392	15.4664
	54	4908511.20	674749.20	4908521.615	674762.496	10.4150	108.4722	13.2960	176.7836	16.8895
	57	4904044.80	678109.80	4904055.15	678123.496	10.3500	107.1225	13.6960	187.5804	17.1669
	63	4909115.40	674729.40	4909123.8	674742.003	8.4000	70.5600	12.6030	158.8356	15.1458
	64	4905647.40	677292.60	4905650.771	677301.612	3.3710	11.3636	9.0120	81.2161	9.6210
	65	4913673.60	674657.40	4913683.126	674672.483	9.5280	90.7447	15.0830	227.4969	17.8393
	67	4909935.00	674719.20	4909944.201	674732.326	9.2010	84.6584	13.1260	172.2919	16.0297
	69	4912533.00	676300.80	4912541.925	676314.982	8.9250	79.6556	14.1920	201.4129	16.7651

MEAN ERROR (m)	8.8623	13.7732	16.3985	
STD. DEV	1.1164	1.0840	1.3175	
RMSE (m)		8.9305	13.6147	16.4499
90% CIRCULAR ERROR				2.6084

Sept 15, 2003(Quickbird-Full Scene) Multispectral bands

Cory POINT	NTMG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
1	4906518.40	673792.8	4906524.9500	673806.8370	6.5900	42.9025	14.0370	197.0374	15.4900
2	4907669.20	674808.8	4907671.7370	674823.5940	12.6370	157.1764	14.7840	218.5667	19.3841
4	4913644.80	673672	4913654.0740	673687.8500	9.2740	86.0071	15.6500	244.9225	18.1915
5	4912010.40	673070.4	4912017.8540	673080.8540	7.4540	55.5621	10.4540	109.2661	12.8393
6	4906950.40	673118.4	4906959.0920	673133.7880	8.6920	75.5509	15.3880	236.7905	17.6732
9	4913683.20	675206.4	4913690.6320	675218.4980	7.4320	55.2346	12.0980	146.3616	14.1985
10	4913695.20	677368.8	4913703.0660	677383.1140	7.8660	61.8740	14.3140	204.8906	16.3329
14	4912416.00	676298.4	4912423.0560	676312.3620	7.0560	49.7871	13.9620	194.9374	15.6437
15	4911096.00	674704.8	4911104.7910	674719.1890	8.7910	77.2617	14.3890	207.0433	16.6619
18	4910001.60	673104	4910007.0220	673118.3450	5.4220	29.3981	14.3450	205.7790	15.3355
19	4910589.60	676315.2	4910596.8770	676329.6540	7.2770	52.9547	14.4540	208.9181	16.1825
20	4910560.80	678278.4	4910568.3530	678293.9080	7.5630	57.0478	15.5080	240.4981	17.2495
23	4909245.80	679418.40	4909253.6320	679434.5430	8.0320	64.5130	16.1430	260.5984	18.0308
24	4909663.20	677954.4	4909671.1460	677971.2400	7.9460	63.1389	16.8400	263.5666	18.6205
25	4909267.20	676663.2	4909273.3600	676678.3330	6.1800	37.9456	15.1330	229.0077	16.3387
26	4908423.20	675276	4908431.6850	675292.6180	8.4850	71.9852	16.6180	276.1579	18.6589
29	4907284.80	675782.4	4907291.5650	675794.7790	6.7850	45.7652	12.3790	153.2396	14.1069
30	4907598.20	676713.6	4907607.4070	676727.0600	8.2070	67.3546	13.4600	181.1716	15.7647
31	4907383.2000	677241.6000	4907392.9650	677255.0560	9.7860	95.7462	13.4560	181.0639	16.6376
34	4906322.40	675405.6	4906330.5410	675421.1710	8.1410	66.2759	15.5710	242.4680	17.5708
35	4905748.80	673833.6	4905758.1030	673846.8300	9.3030	86.5466	13.2300	175.0329	16.1734
37	4903732.80	675163.2	4903740.2630	675175.2780	7.4830	55.6964	12.0780	145.8781	14.1977
38	4903459.20	676524	4903467.3170	676538.6920	8.1170	65.8857	14.6920	215.8549	16.7851
39	4904812.80	677858.4	4904820.5200	677871.8910	7.7200	59.5984	13.4910	182.0071	15.5437
41	4904092.80	678976.8	4904100.1270	678987.8570	7.3270	53.6849	11.0570	122.2572	13.2643
42	4905352.80	674546.4	4905358.8760	674560.5400	6.0760	36.9178	14.1400	199.9396	15.3902
44	4907162.40	673173.6	4907169.7490	673188.1460	7.3490	54.0078	14.5460	211.5661	16.2971
46	4906398.40	678216	4906405.2040	678230.2050	6.8040	46.2944	14.2050	201.7820	15.7504
48	4906672.80	676404	4906680.3030	676417.6820	7.5030	56.2950	13.6820	187.1971	16.6042
50	4903965.60	673272	4903973.2300	673284.6980	7.6300	58.2169	12.6960	161.2392	14.8141
54	4906508.80	674748.00	4906521.615	674762.496	12.8150	164.2242	14.4960	210.1340	19.3483
57	4904044.80	678110.40	4904055.15	678123.496	10.3600	107.1225	13.0960	171.5052	16.6921
63	4909113.60	674726.80	4909123.8	674742.003	10.2000	104.0400	13.2030	174.3192	16.6841
64	4905650.40	677294.40	4905660.771	677301.612	0.3710	0.1376	7.2120	52.0129	7.2215
65	4913676.00	674666.80	4913683.126	674672.483	7.1260	50.7799	15.6830	245.9665	17.2260
67	4909939.20	674719.20	4909944.201	674732.326	5.0010	25.0100	13.1260	172.2919	14.0454
69	4912533.60	676300.80	4912541.925	676314.992	8.3250	69.3056	14.1920	201.4129	16.4535

MEAN ERROR (m)	7.6082	13.8868	16.0163
STD. DEV	2.0610	1.8071	2.1645
RMSE (m)		8.0661	14.0007
90% CIRCULAR ERROR			16.1580
			4.5786

September 15, 2003(Quickbird-Full Scene) Pan band

Rawl	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)	Err Co90% asc order
	1	4908515.95	673793.45	4908524.9500	673806.8370	9.0000	81.0000	13.3870	179.2118	16.1311	15.32341597
	2	4907662.36	674909.95	4907671.7370	674923.5840	9.3770	87.9281	13.6340	185.8660	16.5473	15.61136368
	4	4913644.20	673669.6	4913654.0740	673687.6500	9.8740	97.4959	18.0500	325.8025	20.5742	15.92410506
	6	4912009.10	673066.8	4912017.8540	673080.8540	8.7540	76.6325	14.0540	197.5149	16.5574	15.95368776
	6	4908950.85	673119.6	4908959.0920	673133.7890	8.2420	67.9306	14.1880	201.2993	16.4082	16.13108084
	9	4913680.95	675205.5	4913690.6320	675218.4960	9.6820	93.7411	12.9960	188.9480	16.2077	16.15094127
	10	4913694.10	677368.7	4913703.0660	677383.1140	8.9660	80.3892	14.4140	207.7634	16.9751	16.19396542
	14	4912412.50	676298.6	4912423.0560	676312.3620	10.5560	111.4291	13.7620	189.3926	17.3442	16.20768731
	15	4911095.10	674704.6	4911104.7910	674719.1890	9.6910	93.9155	14.5890	212.8389	17.5144	16.2097433
	18	4909998.45	673100.7	4910007.0220	673118.3450	8.5720	73.4792	17.6450	311.3460	19.6170	16.37005929
	19	4910587.10	676315.8	4910596.8770	676329.6540	9.7770	95.5897	13.8540	191.9333	16.9665	16.39018831
	20	4910559.50	678278.9	4910568.3530	678293.9080	8.8530	78.3756	15.0080	225.2401	17.4246	16.40822684
	23	4909245.70	679420.20	4909253.6320	679434.5430	7.9320	62.9166	14.3430	205.7216	16.3902	16.42142852
	24	4909662.10	677957	4909671.1460	677971.2400	9.0460	81.8301	14.2400	202.7776	16.8703	16.54732864
	25	4909264.30	676664.4	4909273.3600	676678.3330	9.0800	82.0836	13.9330	194.1285	16.6196	16.55739811
	26	4909423.00	675278.4	4909431.6860	675292.6180	8.6860	75.4292	14.2180	202.1515	16.6808	16.59770023
	29	4907281.97	675780.69	4907291.5660	675794.7790	9.5860	92.0640	14.0890	198.4999	17.0459	16.61962963
	30	4907598.00	676713.6	4907607.4070	676727.0600	9.4070	88.4916	13.4600	181.1716	16.4214	16.64584059
	31	4907383.6300	677240.5700	4907392.9650	677255.0560	9.3590	87.5160	14.4860	209.8442	17.2441	16.66075475
	34	4906321.46	675408.09	4906330.5410	675421.1710	9.0810	82.4646	13.0810	171.1126	15.9241	16.69194767
	35	4905748.11	673833.26	4905758.1030	673846.8300	9.9930	99.8600	13.5700	184.1449	16.8524	16.70454097
	37	4903731.80	675161	4903740.2630	675175.2780	8.4630	71.6224	14.2780	203.8613	16.5977	16.85244638
	38	4903458.20	676525.6	4903467.3170	676538.6920	9.1170	83.1197	13.0920	171.4005	15.9537	16.87032057
	39	4904810.60	677857.8	4904820.5200	677871.8910	9.9200	98.4064	14.0910	198.5563	17.2326	16.95249872
	41	4904090.00	678975.2	4904100.1270	678987.8570	10.1270	102.5561	12.6570	160.1996	16.2097	16.9565045
	42	4905350.40	674547.43	4905358.8760	674560.5400	8.4780	71.8426	13.1100	171.8721	15.6114	16.96492455
	44	4907161.05	673173.9	4907169.7490	673188.1460	8.6990	75.6726	14.2460	202.9485	16.6919	16.97505676
	46	4908396.10	678216.6	4908405.2040	678230.2050	9.1040	82.8828	13.6050	185.0960	16.3701	17.04593635
	48	4906671.17	676403.4	4906680.3030	676417.6820	9.1330	83.4117	14.2820	203.9755	16.9525	17.19073544
	50	4903963.00	673272.2	4903973.2300	673284.6980	10.2300	104.6529	12.4960	156.2000	16.1509	17.23260517
	54	4908510.45	674748.15	4908521.615	674762.496	11.1680	124.6572	14.3460	205.8077	18.1787	17.24413584
	57	4904046.20	678110.00	4904055.15	678123.496	8.9500	80.1025	13.4960	182.1420	16.1940	17.3442146
	63	4909114.80	674728.00	4909123.8	674742.003	9.0000	81.0000	14.0030	196.0840	16.6458	17.42457096
	64	4905641.40	677287.20	4905650.771	677301.612	9.3710	87.8156	14.4120	207.7057	17.1907	17.51440556
	65	4913674.05	674658.15	4913683.126	674672.483	9.0760	82.3738	14.3330	205.4349	16.9649	18.1786947
	67	4909937.00	674718.80	4909944.201	674732.326	7.2010	51.8544	13.5260	182.9527	15.3234	19.61896228
	69	4912532.80	676301.00	4912541.925	676314.992	9.1250	83.2656	13.9920	195.7761	16.7045	20.57421629

MEAN ERROR (m)	9.2069	14.0803	16.8448
STD. DEV	0.7346	1.0717	0.9695
RMSE (m)	9.2354	14.1259	16.8770
90% CIRCULAR ERROR			2.1762

September 15, 2003(Quickbird-Full Scene) Multispectral bands

Ravi										
POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)	Err CE90% asc order
1	4908516.00	673793.49	4908524.9500	673806.8370	8.9500	80.1025	13.3470	178.1424	16.0700	13.9771
2	4907661.94	674911.2	4907671.7370	674923.5840	9.7970	95.9812	12.3840	153.3635	15.7907	15.1272
4	4913645.40	673669.4	4913654.0740	673687.6500	8.6740	75.2383	18.2500	333.0625	20.2065	15.2088
5	4912009.92	673066.08	4912017.8540	673080.8540	7.9340	62.9484	14.7740	218.2711	16.7696	15.2857
6	4908951.36	673119.6	4908959.0920	673133.7880	7.7320	59.7838	14.1880	201.2993	16.1581	15.3420
9	4913681.76	675205.68	4913690.6320	675218.4980	8.8720	78.7124	12.8180	164.3011	15.5889	15.4345
10	4913694.80	677369	4913703.0660	677383.1140	8.2660	68.3268	14.1140	199.2050	16.3564	15.5889
14	4912413.20	676298.8	4912423.0560	676312.3620	9.8660	97.1407	13.5520	183.9278	16.7651	15.6026
15	4911096.00	674704.2	4911104.7910	674719.1890	8.7910	77.2817	14.9890	224.6701	17.3768	15.6604
18	4909999.40	673101.2	4910007.0220	673118.3450	7.6220	58.0949	17.1450	293.9510	18.7629	15.6938
19	4910587.20	676315.2	4910596.8770	676329.6540	9.6770	93.6443	14.4540	208.9181	17.3943	15.7907
20	4910569.80	678279.6	4910568.3530	678293.9080	8.5530	73.1538	14.3080	204.7189	16.6695	15.9028
23	4909245.20	679420.60	4909253.6320	679434.5430	8.4320	71.0886	13.9430	194.4072	16.2944	15.9213
24	4909662.00	677957.6	4909671.1460	677971.2400	9.1460	83.6493	13.6400	186.0496	16.4225	15.9835
25	4909264.00	676663.2	4909273.3600	676678.3330	9.3600	87.6096	15.1330	229.0077	17.7937	16.0700
26	4909423.00	675279.2	4909431.6850	675292.6180	8.6850	75.4292	13.4180	180.0427	15.9835	16.1581
29	4907282.40	675760	4907291.5650	675794.7790	9.1650	83.9972	14.7790	218.4188	17.3901	16.2807
30	4907598.40	676713.2	4907607.4070	676727.0600	9.0070	81.1260	13.8600	192.0996	16.5295	16.2944
31	4907384.2000	677241.8000	4907392.9850	677255.0560	8.7850	77.1762	13.2560	175.7215	15.9028	16.3564
34	4906322.60	675408.2	4906330.5410	675421.1710	7.9410	63.0595	12.9710	168.2468	15.2088	16.3661
35	4905748.20	673833.8	4905758.1030	673846.8300	9.9030	98.0694	13.0300	169.7809	16.3661	16.4225
37	4903730.80	675162.8	4903740.2630	675175.2780	9.4630	89.5484	12.4780	155.7005	15.6604	16.5295
38	4903469.00	678525.8	4903467.3170	678538.8920	8.3170	69.1725	12.8920	166.2037	15.3420	16.6329
39	4904812.00	677859.2	4904820.5200	677871.8910	8.5200	72.5904	12.6910	161.0615	15.2857	16.6497
41	4904090.40	678974.2	4904100.1270	678987.8570	9.7270	94.6145	13.6570	186.5136	16.7669	16.6695
42	4905349.60	674547.6	4905358.8760	674560.5400	9.2760	86.0442	12.9400	167.4436	15.9213	16.7100
44	4907161.00	673174	4907169.7490	673188.1460	8.7490	76.5450	14.1460	200.1093	16.6329	16.7545
46	4908396.20	678216.2	4908405.2040	678230.2050	9.0040	81.0720	14.0050	196.1400	16.6497	16.7651
48	4906671.80	676404.6	4906680.3030	676417.6820	8.5030	72.3010	13.0820	171.1387	15.6026	16.7669
50	4903963.40	673273.2	4903973.2300	673284.6980	9.8300	96.6289	11.4980	132.2040	15.1272	16.7696
54	4908510.40	674748.80	4908521.615	674762.496	11.2150	125.7762	13.6960	187.5804	17.7019	17.3768
57	4904047.20	678112.00	4904055.15	678123.496	7.9500	63.2025	11.4960	132.1580	13.9771	17.3901
63	4909116.27	674728.53	4909123.8	674742.003	7.5300	56.7009	13.4730	181.5217	15.4345	17.3943
64	4905641.87	677287.47	4905650.771	677301.612	8.9010	79.2278	14.1420	199.9962	16.7100	17.7019
65	4913674.93	674667.87	4913683.126	674672.483	8.1960	67.1744	14.6130	213.5398	16.7545	17.7937
67	4909935.20	674719.47	4909944.201	674732.326	9.0010	81.0180	12.8560	165.2767	15.6938	18.7629
69	4912533.07	676301.33	4912541.925	676314.992	8.8550	78.4110	13.6520	186.6502	16.2807	20.2065

MEAN ERROR (m)	8.8699	13.7754	16.4146
STD. DEV	0.7582	1.2873	1.0957
RMSE (m)		8.9013	13.8338
90% CIRCULAR ERROR			16.4502
			2.5024

Sept 15, 2003(Quickbird-Full Scene) Pan band

Tim	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	1	4908516.60	673792.8	4908524.9500	673806.8370	8.3500	69.7225	14.0370	197.0374	16.3328
	2	4907662.80	674910	4907671.7370	674923.5840	8.9370	79.8700	13.5840	184.5251	16.2602
	4	4913644.80	673576.8	4913654.0740	673587.6500	9.2740	86.0071	10.8500	117.7225	14.2734
	5	4912009.20	673066.8	4912017.8540	673080.8540	8.6540	74.8917	14.0540	197.5149	16.5047
	6	4908951.00	673119.6	4908959.0920	673133.7880	8.0920	65.4805	14.1880	201.2993	16.3334
	9	4913681.40	675204.6	4913690.6320	675218.4980	9.2320	85.2298	13.8980	193.1544	16.6849
	10	4913694.60	677368.8	4913703.0660	677383.1140	8.4660	71.6732	14.3140	204.8906	16.6302
	14	4912413.60	676298.4	4912423.0560	676312.3620	9.4560	89.4159	13.9620	194.9374	16.8628
	15	4911096.00	674704.2	4911104.7910	674719.1890	8.7910	77.2817	14.9890	224.6701	17.3768
	18	4909998.60	673103.4	4910007.0220	673118.3450	8.4220	70.9301	14.9450	223.3530	17.1547
	19	4910587.20	676315.8	4910596.8770	676329.6540	9.6770	93.6443	13.8540	191.9333	16.8990
	20	4910559.60	678278.4	4910568.3530	678293.9080	8.7530	76.6150	15.5080	240.4981	17.8077
	23	4909245.60	679420.20	4909253.6320	679434.5430	8.0320	64.5130	14.3430	205.7216	16.4368
	24	4909662.60	677956.8	4909671.1460	677971.2400	8.5460	73.0341	14.4400	208.5136	16.7794
	25	4909264.80	676664.4	4909273.3600	676678.3330	8.5600	73.2736	13.9330	194.1285	16.3524
	26	4909423.20	675278.4	4909431.6850	675292.6180	8.4850	71.9952	14.2180	202.1515	16.5574
	29	4907282.40	675780.6	4907291.5650	675794.7790	9.1650	83.9972	14.1790	201.0440	16.8832
	30	4907598.00	676713.6	4907607.4070	676727.0600	9.4070	88.4916	13.4600	181.1716	16.4214
	31	4907384.40	677240.40	4907392.9850	677255.0560	8.5850	73.7022	14.6560	214.7983	16.9853
	34	4906321.80	675408	4906330.5410	675421.1710	8.7410	76.4051	13.1710	173.4752	15.8076
	35	4905748.20	673833	4905758.1030	673846.8300	9.9030	98.0694	13.8300	191.2689	17.0099
	37	4903730.40	675164.4	4903740.2630	675175.2780	9.8630	97.2788	10.8780	118.3309	14.6837
	38	4903458.60	676525.8	4903467.3170	676538.6920	8.7170	75.9861	12.8920	166.2037	15.5624
	39	4904812.20	677855.4	4904820.5200	677871.8910	8.3200	69.2224	16.4910	271.9531	18.4709
	41	4904090.40	678975.6	4904100.1270	678987.8570	9.7270	94.6145	12.2570	150.2340	15.6476
	42	4905349.80	674547	4905358.8760	674560.5400	9.0760	82.3738	13.5400	183.3316	16.3005
	44	4907161.20	673174.2	4907169.7490	673188.1460	8.5490	73.0854	13.9460	194.4909	16.3578
	46	4906396.00	678216.6	4906405.2040	678230.2050	9.2040	84.7136	13.6050	185.0960	16.4259
	47	4906973.40	678031.2	4906983.9870	678045.6440	10.5870	112.0846	14.4440	208.6291	17.9085
	48	4906671.80	676402.8	4906680.3030	676417.6820	8.7030	75.7422	14.8820	221.4739	17.2400
	50	4903962.60	673272	4903973.2300	673284.6980	10.6300	112.9969	12.6980	161.2392	16.5601
	54	4908510.00	674748.60	4908521.615	674762.496	11.6150	134.9082	13.8960	193.0988	18.1110
	57	4904045.40	678110.40	4904055.15	678123.496	9.7500	95.0625	13.0960	171.5052	16.3269
	63	4909115.40	674728.80	4909123.8	674742.003	8.4000	70.5600	13.2030	174.3192	15.6486
	64	4905645.00	677292.60	4905650.771	677301.612	5.7710	33.3044	9.0120	81.2161	10.7014
	65	4913674.20	674658.00	4913683.126	674672.483	8.9260	79.6735	14.4830	209.7573	17.0127
	67	4909936.20	674718.60	4909944.201	674732.326	8.0010	64.0160	13.7260	188.4031	15.8877
	69	4912533.60	676300.80	4912541.925	676314.992	8.3250	69.3056	14.1920	201.4129	16.4535

MEAN ERROR (m)	8.9393	13.7277	16.4120
STD. DEV	0.9383	1.3088	1.2549
RMSE (m)		8.9871	13.7883
90% CIRCULAR ERROR			16.4586
			2.6974

Sept 15, 2003(Quickbird-Full Scene) Multispectral bands

POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
1	4908518.40	673790.4	4908524.9500	673806.8370	6.5500	42.9025	16.4370	270.1750	17.6940
2	4907664.00	674908.8	4907671.7370	674923.5840	7.7370	59.8612	14.7840	218.5667	16.6862
4	4913644.80	673572	4913654.0740	673587.6500	9.2740	86.0071	15.6500	244.9225	18.1915
5	4912010.40	673065.6	4912017.8540	673080.8540	7.4540	55.5621	15.2540	232.6845	16.9778
6	4908950.40	673118.4	4908959.0920	673133.7880	8.6920	75.5509	15.3880	236.7905	17.6732
9	4913683.20	675204	4913690.6320	675218.4980	7.4320	55.2346	14.4980	210.1920	16.2919
10	4913695.20	677368.8	4913703.0660	677383.1140	7.8660	61.8740	14.3140	204.8906	16.3329
14	4912413.60	676298.4	4912423.0560	676312.3620	9.4560	89.4159	13.9620	194.9374	16.8628
15	4911096.00	674704.8	4911104.7910	674719.1890	8.7910	77.2817	14.3890	207.0433	16.8619
18	4909999.20	673101.6	4910007.0220	673118.3450	7.8220	61.1837	16.7450	280.3950	18.4818
19	4910589.60	676315.2	4910596.8770	676329.6540	7.2770	52.9547	14.4540	208.9181	16.1825
20	4910560.80	678278.4	4910568.3530	678293.9080	7.5530	57.0478	15.5080	240.4981	17.2495
23	4909245.60	679420.80	4909253.6320	679434.5430	8.0320	64.5130	13.7430	188.8700	15.9180
24	4909663.20	677956.8	4909671.1460	677971.2400	7.9460	63.1389	14.4400	208.5136	16.4819
25	4909264.80	676663.2	4909273.3600	676678.3330	8.5600	73.2736	15.1330	229.0077	17.3862
26	4909425.60	675276	4909431.6850	675292.6180	8.0850	37.0272	16.6180	276.1579	17.6970
29	4907282.40	675780	4907291.5650	675794.7790	9.1650	83.9972	14.7790	218.4188	17.3901
30	4907599.20	676711.2	4907607.4070	676727.0600	8.2070	67.3548	15.8600	251.5396	17.8576
31	4907383.20	677239.20	4907392.9850	677255.0560	9.7850	95.7462	15.8560	251.4127	18.6322
34	4906324.80	675408	4906330.5410	675421.1710	5.7410	32.9591	13.1710	173.4752	14.3678
35	4905748.80	673833.6	4905758.1030	673846.6300	9.3030	86.5458	13.2300	175.0329	16.1734
37	4903730.40	675163.2	4903740.2630	675175.2780	9.8630	97.2788	12.0780	145.8781	15.5935
38	4903459.20	676526.4	4903467.3170	676538.6920	8.1170	65.8857	12.2920	151.0933	14.7302
39	4904815.20	677856	4904820.5200	677871.8910	5.3200	28.3024	15.8910	252.5239	16.7579
41	4904090.40	678974.4	4904100.1270	678987.8570	9.7270	94.6145	13.4570	181.0908	16.6044
42	4905350.40	674546.4	4905358.8760	674560.5400	8.4760	71.8426	14.1400	199.9396	16.4858
44	4907162.40	673173.6	4907169.7490	673188.1460	7.3490	54.0078	14.5480	211.5861	16.2971
46	4908398.40	678216	4908405.2040	678230.2050	6.8040	46.2944	14.2050	201.7820	15.7504
47	4906975.20	678031.2	4906983.9870	678045.6440	8.7870	77.2114	14.4440	208.6291	16.9068
48	4906670.40	676401.6	4906680.3030	676417.6820	9.9030	98.0694	16.0820	258.6307	18.8865
50	4903963.20	673272	4903973.2300	673284.6980	10.0300	100.6009	12.6980	161.2392	16.1815
54	4908511.20	674748.00	4908521.615	674762.496	10.4150	108.4722	14.4960	210.1340	17.8495
57	4904047.20	678110.40	4904055.15	678123.496	7.9500	63.2025	13.0960	171.5052	15.3202
63	4909116.00	674726.40	4909123.8	674742.003	7.8000	60.8400	15.6030	243.4536	17.4440
64	4905648.00	677292.00	4905650.771	677301.612	2.7710	7.6784	9.6120	92.3905	10.0034
65	4913676.00	674656.80	4913683.126	674672.483	7.1260	50.7799	15.6830	245.9565	17.2260
67	4909936.80	674721.60	4909944.201	674732.326	7.4010	54.7748	10.7260	115.0471	13.0316
69	4912533.60	676300.80	4912541.925	676314.992	8.3250	69.3056	14.1920	201.4129	16.4535
MEAN ERROR (m)					8.0235		14.4067		16.5503
STD. DEV					1.4914		1.5399		1.5991
RMSE (m)						8.1573		14.4866	16.6254
90% CIRCULAR ERROR									3.5908

OCT 21, 2003(Quickbird) Pan band

Cory

POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
1	4908517.80	673797	4908524.9500	673806.8370	7.1500	51.1225	9.8370	96.7666	12.1610
2	4907663.40	674914.2	4907671.7370	674923.5840	8.3370	69.5056	9.3840	88.0595	12.5525
4	4913647.20	673681	4913654.0740	673687.6500	6.8740	47.2519	6.6500	44.2225	9.5642
5	4912010.40	673071.6	4912017.8540	673080.8540	7.4540	55.5621	9.2540	85.6365	11.8827
6	4908951.00	673123.8	4908959.0920	673133.7880	8.0920	65.4805	9.9880	99.7601	12.8546
9	4913682.00	675211.8	4913690.6320	675218.4980	8.6320	74.5114	8.6980	44.8632	10.9259
10	4913696.40	677374.8	4913703.0660	677383.1140	6.6660	44.4356	8.3140	69.1226	10.6564
14	4912413.60	676303.8	4912423.0560	676312.3620	9.4560	89.4159	8.5620	73.3078	12.7563
15	4911096.60	674710.8	4911104.7910	674719.1890	8.1910	67.0925	8.3890	70.3753	11.7247
18	4909999.80	673108.8	4910007.0220	673118.3450	7.2220	52.1573	9.5450	91.1070	11.9693
19	4910588.40	676320.6	4910596.8770	676329.6540	8.4770	71.8595	9.0540	81.9749	12.4030
20	4910559.60	678283.2	4910568.3530	678293.9080	8.7530	76.6150	10.7080	114.6613	13.8303
23	4909245.00	679425.00	4909253.6320	679434.5430	8.6320	74.5114	9.5430	91.0688	12.8678
24	4909663.20	677961.6	4909671.1460	677971.2400	7.9460	63.1389	9.6400	92.9296	12.4927
29	4907283.60	675785.4	4907291.5650	675794.7790	7.9650	63.4412	9.3790	87.9656	12.3047
30	4907599.80	676717.2	4907607.4070	676727.0600	7.6070	57.8664	9.8600	97.2196	12.4534
31	4907386.00	677244.6	4907392.9850	677255.0560	7.9850	63.7602	10.4560	109.3279	13.1553
34	4906323.00	675411.6	4906330.5410	675421.1710	7.5410	56.8667	9.5710	91.6040	12.1849
35	4905749.40	673836.60	4905758.1030	673846.8300	8.7030	75.7422	10.2300	104.6529	13.4311
37	4903732.20	675165	4903740.2630	675175.2780	8.0630	65.0120	10.2780	105.6373	13.0633
38	4903460.40	676528.8	4903467.3170	676538.6920	6.9170	47.8449	9.8920	97.8517	12.0705
39	4904811.60	677860.8	4904820.5200	677871.8910	8.9200	79.5664	11.0910	123.0103	14.2329
41	4904092.20	678978.6	4904100.1270	678987.8570	7.9270	62.8373	9.2570	85.6920	12.1873
42	4905351.60	674551.8	4905358.8760	674560.5400	7.2760	52.9402	8.7400	76.3876	11.3722
44	4907163.00	673178.4	4907169.7490	673188.1460	6.7490	45.5490	9.7460	94.9845	11.8547
47	4906975.20	678035.4	4906983.9870	678045.6440	8.7870	77.2114	10.2440	104.9395	13.4963
48	4906672.80	676407	4906680.3030	676417.6820	7.5030	56.2950	10.6820	114.1051	13.0537
50	4903966.20	673274.4	4903973.2300	673284.6980	7.0300	49.4209	10.2980	106.0488	12.4687
54	4908511.20	674753.4	4908521.6150	674762.4960	10.4150	108.4722	9.0960	82.7372	13.8279
57	4904048.40	678109.2	4904055.1500	678123.4960	6.7500	45.5625	14.2960	204.3756	15.8094
63	4909115.40	674732.4	4909123.8000	674742.0030	8.4000	70.5600	9.6030	92.2176	12.7584
64	4905649.20	677296.80	4905650.771	677301.612	1.5710	2.4680	4.8120	23.1553	5.0620
65	4913676.00	674664.60	4913683.126	674672.483	7.1260	50.7799	7.8830	62.1417	10.6265
67	4909936.20	674724.60	4909944.201	674732.326	8.0010	64.0160	7.7260	59.6911	11.1224
69	4912533.00	676306.20	4912541.925	676314.992	8.9250	79.6556	8.7920	77.2993	12.5282

MEAN ERROR (m)

STD. DEV

RMSE (m)

90% CIRCULAR ERROR

7.7727

1.3723

7.8895

9.3571

1.5385

9.4792

12.2202

1.6872

12.3328

3.4532

OCT 21, 2003(Quickbird) Multispectral bands

Cory	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	1	4908518.40	673795.2	4908524.9500	673806.8370	6.5500	42.9025	11.6370	135.4198	13.3537
	2	4907664.00	674913.6	4907671.7370	674923.5840	7.7370	59.8612	9.9840	99.6803	12.6310
	4	4913647.20	673581.6	4913654.0740	673587.6500	6.8740	47.2519	6.0500	36.6025	9.1572
	5	4912010.40	673070.4	4912017.8540	673080.8540	7.4540	55.5621	10.4540	109.2861	12.8393
	6	4908952.80	673123.2	4908959.0920	673133.7880	6.2920	39.5893	10.5880	112.1057	12.3165
	9	4913685.60	675211.2	4913690.6320	675218.4980	5.0320	25.3210	7.2980	53.2608	8.8646
	10	4913695.20	677373.6	4913703.0660	677383.1140	7.8660	61.8740	9.5140	90.5162	12.3446
	14	4912416.00	676305.6	4912423.0560	676312.3620	7.0560	49.7871	6.7620	45.7246	9.7730
	15	4911096.00	674707.2	4911104.7910	674719.1890	8.7910	77.2817	11.9890	143.7361	14.8667
	18	4910001.60	673108.8	4910007.0220	673118.3450	5.4220	29.3981	9.5450	91.1070	10.9775
	19	4910592.00	676320	4910596.8770	676329.6540	4.8770	23.7851	9.6540	93.1997	10.8160
	20	4910561.60	678284.2	4910568.3530	678293.9080	6.7530	45.6030	9.7080	94.2453	11.8257
	23	4909242.30	679425.20	4909253.6320	679434.5430	11.3320	128.4142	9.3430	87.2916	14.8869
	24	4909663.60	677962.6	4909671.1460	677971.2400	7.5460	56.9421	8.6400	74.6496	11.4713
	29	4907284.80	675782.1	4907291.5650	675794.7790	6.7650	45.7652	12.6790	160.7570	14.3709
	30	4907599.20	676716	4907607.4070	676727.0600	8.2070	67.3548	11.0600	122.3236	13.7724
	31	4907385.60	677243.5	4907392.9850	677255.0560	7.3850	54.5382	11.5560	133.5411	13.7142
	34	4906327.20	675413.1	4906330.5410	675421.1710	3.3410	11.1623	8.0710	65.1410	8.7352
	35	4905749.23	673837.17	4905758.1030	673846.8300	8.8730	78.7301	9.6600	93.3156	13.1166
	37	4903733.49	675163.1	4903740.2630	675175.2780	6.7730	45.8735	12.1780	148.3037	13.9347
	38	4903458.85	676527.6	4903467.3170	676538.8920	8.4670	71.6901	11.0920	123.0325	13.9543
	39	4904812.20	677860.8	4904820.5200	677871.8910	8.3200	69.2224	11.0910	123.0103	13.8648
	41	4904091.90	678977.25	4904100.1270	678987.8570	8.2270	67.6835	10.6070	112.5084	13.4236
	42	4905351.30	674551.65	4905358.8760	674560.5400	7.5760	57.3958	8.8900	79.0321	11.6802
	44	4907162.40	673177.95	4907169.7490	673188.1460	7.3490	54.0078	10.1960	103.9584	12.5685
	47	4906975.20	678036	4906983.9870	678045.6440	8.7870	77.2114	9.6440	93.0067	13.0468
	48	4906672.80	676406.2	4906680.3030	676417.8820	7.5030	56.2950	11.4820	131.8363	13.7161
	50	4903965.30	673274.4	4903973.2300	673284.6980	7.9300	62.8849	10.2980	106.0488	12.9974
	54	4908515.80	674752.8	4908521.6150	674762.4960	5.8150	33.8142	9.6960	94.0124	11.3060
	57	4904047.30	678112.8	4904055.1500	678123.4960	7.8500	61.6225	10.6960	114.4044	13.2675
	63	4909118.20	674731.2	4909123.8000	674742.0030	5.6000	31.3600	10.8030	116.7048	12.1682
	64	4905648.03	677296.80	4905650.98	677301.612	2.9500	8.7025	4.8120	23.1553	5.6443
	65	4913676.10	674664.00	4913683.23	674672.483	7.1300	50.8369	8.4830	71.9613	11.0814
	67	4909937.20	674721.60	4909944.22	674732.326	7.0200	49.2804	10.7260	115.0471	12.8190
	69	4912536.02	676310.40	4912541.8	676314.992	5.7800	33.4084	4.5920	21.0865	7.3821

MEAN ERROR (m)

STD. DEV

7.0637

1.5909

9.6994

1.9273

12.0711

2.1111

RMSE (m)

90% CIRCULAR ERROR

7.2357

9.8836

12.2491

4.1859

OCT 21, 2003(Quickbird) Pan band

Ravi	POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	1	4908516.60	673798.2	4908524.9500	673806.8370	8.3500	69.7225	8.6370	74.5978	12.0133
	2	4907663.43	674914.13	4907671.7370	674923.5840	8.3070	69.0062	9.4540	89.3781	12.5851
	4	4913646.10	673576.2	4913654.0740	673587.6500	7.9740	63.5847	11.4500	131.1025	13.9530
	5	4912010.64	673073.4	4912017.8540	673080.8540	7.2140	52.0418	7.4540	55.5521	10.3732
	6	4908950.80	673124.4	4908959.0920	673133.7880	8.2920	68.7573	9.3880	88.1345	12.5256
	9	4913682.30	675212.4	4913690.6320	675218.4980	8.3320	69.4222	6.0980	37.1856	10.3251
	10	4913695.80	677374.65	4913703.0660	677383.1140	7.2660	52.7948	8.4640	71.6393	11.1550
	14	4912413.90	676303.95	4912423.0560	676312.3620	9.1560	83.8323	8.4120	70.7617	12.4336
	15	4911096.20	674710.1	4911104.7910	674719.1890	8.5910	73.8053	9.0890	82.6099	12.5066
	18	4909999.70	673109.1	4910007.0220	673118.3450	7.3220	53.6117	9.2450	85.4700	11.7933
	19	4910587.60	676321	4910596.8770	676329.6540	9.2770	86.0627	8.6540	74.8917	12.6868
	20	4910561.25	678283.95	4910568.3530	678293.9080	7.1030	50.4526	9.9580	99.1618	12.2317
	23	4909246.20	679425.12	4909253.6320	679434.5430	7.4320	55.2346	9.4230	88.7929	12.0011
	24	4909663.44	677961.84	4909671.1460	677971.2400	7.7060	59.3824	9.4000	88.3600	12.1549
	29	4907283.15	675784.88	4907291.5650	675794.7790	8.4150	70.8122	9.8990	97.9902	12.9924
	30	4907599.02	676717.86	4907607.4070	676727.0600	8.3870	70.3418	9.2000	84.6400	12.4492
	31	4907385.00	677244.60	4907392.9850	677255.0560	7.9850	63.7602	10.4560	109.3279	13.1563
	34	4906322.58	675411.78	4906330.5410	675421.1710	7.9610	63.3775	9.3910	88.1909	12.3113
	35	4905749.16	673837.32	4905758.1030	673846.8300	8.9430	79.9772	9.5100	90.4401	13.0544
	37	4903733.40	675162.6	4903740.2630	675175.2780	6.8630	47.1008	12.6780	160.7317	14.4164
	38	4903459.65	676527.6	4903467.3170	676538.6920	7.6670	58.7829	11.0920	123.0325	13.4839
	39	4904812.20	677860.8	4904820.5200	677871.8910	8.3200	69.2224	11.0910	123.0103	13.8648
	41	4904091.90	678977.25	4904100.1270	678987.8570	8.2270	67.6835	10.6070	112.5084	13.4236
	42	4905351.30	674551.65	4905358.8760	674560.5400	7.5760	57.3858	8.8900	79.0321	11.6802
	44	4907162.40	673177.95	4907169.7490	673188.1460	7.3490	54.0078	10.1960	103.9584	12.5685
	47	4906973.85	678035.63	4906983.9870	678045.6440	10.1370	102.7588	10.0140	100.2802	14.2492
	48	4906672.35	676407.15	4906680.3030	676417.6820	7.9530	63.2502	10.5320	110.9230	13.1975
	50	4903964.40	673275.5	4903973.2300	673284.6980	8.8300	77.9689	9.3980	88.3224	12.8954
	54	4908511.50	674752.50	4908521.615	674762.496	10.1150	102.3132	9.9960	99.9200	14.2209
	57	4904046.40	678111.80	4904055.15	678123.496	8.7500	76.5625	11.6960	136.7964	14.6068
	63	4909115.40	674732.40	4909123.8	674742.003	8.4000	70.5600	9.6030	92.2176	12.7584
	64	4905642.60	677291.00	4905650.771	677301.612	8.1710	66.7652	10.6120	112.6145	13.3933
	65	4913675.20	674664.40	4913683.126	674672.483	7.9260	62.8215	8.0830	65.3349	11.3206
	67	4909936.00	674723.80	4909944.201	674732.326	8.2010	67.2564	8.5260	72.6927	11.8300
	69	4912533.40	676304.60	4912541.925	676314.992	8.5250	72.6756	10.3920	107.9937	13.4413
MEAN ERROR (m)						8.2007		9.6282		12.6872
STD. DEV						0.7540		1.2486		1.0420
RMSE (m)							8.2343		9.7066	12.7287
90% CIRCULAR ERROR										2.4432

OCT 21, 2003(Quickbird) Multispectral bands

Ravi

POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
1	4908518.18	673797.6	4908524.9500	673806.8370	6.7700	45.8329	9.2370	85.3222	11.4523
2	4907664.22	674913.82	4907671.7370	674923.5840	7.5170	56.5053	9.7640	95.3357	12.3224
4	4913646.92	673575.95	4913654.0740	673587.6500	7.1540	51.1797	11.7000	136.8900	13.7139
5	4912010.40	673072.67	4912017.8540	673080.8540	7.4540	55.5621	8.1840	66.9779	11.0698
6	4908953.40	673123.8	4908959.0920	673133.7880	5.6920	32.3989	9.9880	99.7601	11.4960
9	4913683.20	675210	4913690.6320	675218.4980	7.4320	55.2346	8.4980	72.2160	11.2894
10	4913695.37	677375.14	4913703.0660	677383.1140	7.6960	59.2284	7.9740	63.5847	11.0821
14	4912414.05	676308.6	4912423.0560	676312.3620	9.0060	81.1080	3.7620	14.1526	9.7602
15	4911097.20	674710.56	4911104.7910	674719.1890	7.5910	57.6233	8.6290	74.4596	11.4927
18	4910000.16	673106.16	4910007.0220	673118.3450	6.8620	47.0870	12.1850	148.4742	13.9843
19	4910566.32	676320.48	4910596.8770	676329.6540	30.5570	933.7302	9.1740	84.1623	31.9044
20	4910560.56	678284.16	4910568.3530	678293.9080	7.7930	60.7308	9.7480	95.0235	12.4802
23	4909246.56	679425.36	4909253.6320	679434.5430	7.0720	50.0132	9.1830	84.3275	11.5905
24	4909662.96	677962.56	4909671.1460	677971.2400	8.1860	67.0106	8.6600	75.3424	11.9312
29	4907283.60	675784.56	4907291.5650	675794.7790	7.9650	63.4412	10.2190	104.4280	12.9564
30	4907600.06	676717.37	4907607.4070	676727.0600	7.3470	53.9784	9.6900	93.8961	12.1604
31	4907385.43	677244.34	4907392.9850	677255.0560	7.5550	57.0780	10.7160	114.8327	13.1115
34	4906324.97	675412.63	4906330.5410	675421.1710	5.5710	31.0360	8.5410	72.9487	10.1973
35	4905750.00	673837.54	4905758.1030	673846.8300	8.1030	65.6586	9.2900	86.3041	12.3273
37	4903733.20	675166	4903740.2630	675175.2780	7.0630	49.8860	9.2780	86.0813	11.6605
38	4903460.60	676527.4	4903467.3170	676538.6920	6.7170	45.1181	11.2920	127.5093	13.1388
39	4904813.00	677861.6	4904820.5200	677871.6910	7.5200	56.5504	10.2910	105.9047	12.7458
41	4904091.60	678976	4904100.1270	678987.9570	8.5270	72.7097	11.8570	140.5884	14.6047
42	4905351.60	674551	4905358.8760	674560.5400	7.2760	52.9402	9.5400	91.0116	11.9980
44	4907162.58	673178.58	4907169.7490	673188.1460	7.1690	51.3946	9.5660	91.5084	11.9542
47	4906974.83	678034.52	4906983.9870	678045.6440	9.1570	83.8506	11.1240	123.7434	14.4081
48	4906672.35	676407.15	4906680.3030	676417.6820	7.9530	63.2502	10.5320	110.9230	13.1975
50	4903966.04	673274.4	4903973.2300	673284.6980	7.1900	51.6961	10.2980	106.0488	12.5597
54	4908512.40	674753.76	4908521.615	674762.496	9.2150	84.9162	8.7360	76.3177	12.6978
57	4904047.20	678113.40	4904055.15	678123.496	7.9500	63.2025	10.0960	101.9292	12.8504
63	4909116.60	674733.00	4909123.8	674742.003	7.2000	51.8400	9.0030	81.0540	11.5280
64	4905643.50	677291.40	4905650.771	677301.612	7.2710	52.8674	10.2120	104.2849	12.5360
65	4913675.40	674664.00	4913683.126	674672.483	7.7260	59.6911	8.4830	71.9613	11.4740
67	4909936.20	674723.10	4909944.201	674732.326	8.0010	64.0160	9.2260	85.1191	12.2121
69	4912534.20	676307.10	4912541.925	676314.992	7.7250	59.6756	7.8920	62.2837	11.0435

MEAN ERROR (m)

8.1995

9.5025

12.7695

STD. DEV

3.9665

1.4781

3.4965

RMSE (m)

9.0838

9.6135

13.2263

90% CIRCULAR ERROR

7.0902

OCT 21, 2003(Quickbird) Panbands

Tim

POINT	NTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
1	4908517.20	673797.6	4908524.9500	673806.8370	7.7500	60.0625	9.2370	85.3222	12.0576
2	4907664.00	674913.6	4907671.7370	674923.5840	7.7370	59.8612	9.9840	99.6803	12.6310
4	4913646.60	673582.8	4913654.0740	673587.6500	7.4740	55.8607	4.8500	23.5225	8.9097
5	4912010.40	673073.4	4912017.8540	673080.8540	7.4540	55.5621	7.4540	55.5621	10.5415
6	4908951.00	673123.8	4908959.0920	673133.7880	8.0920	65.4805	9.9880	99.7601	12.8546
9	4913682.60	675211.2	4913690.6320	675218.4980	8.0320	64.5130	7.2980	53.2608	10.8524
10	4913695.80	677375.40	4913703.0660	677383.1140	7.2660	52.7948	7.7140	59.5058	10.5972
14	4912413.60	676305	4912423.0560	676312.3620	9.4560	89.4159	7.3620	54.1990	11.9839
15	4911096.60	674710.2	4911104.7910	674719.1890	8.1910	67.0925	8.9890	80.8021	12.1612
18	4909999.80	673108.8	4910007.0220	673118.3450	7.2220	52.1573	9.5450	91.1070	11.9693
19	4910588.40	676320.6	4910596.8770	676329.6540	8.4770	71.8595	9.0540	81.9749	12.4030
20	4910560.20	678283.8	4910568.3530	678293.9080	8.1530	66.4714	10.1080	102.1717	12.9863
23	4909245.60	679425.00	4909253.6320	679434.5430	8.0320	64.5130	9.5430	91.0688	12.4732
24	4909663.20	677961.6	4909671.1460	677971.2400	7.9460	63.1389	9.6400	92.9296	12.4927
29	4907283.00	675784.8	4907291.5650	675794.7790	8.5650	73.3592	9.9790	99.5804	13.1507
30	4907599.20	676717.2	4907607.4070	676727.0600	8.2070	67.3548	9.8600	97.2196	12.8287
31	4907385.00	677244	4907392.9850	677255.0560	7.9850	63.7602	11.0560	122.2351	13.6380
34	4906323.00	675411.6	4906330.5410	675421.1710	7.5410	56.8667	9.5710	91.6040	12.1849
35	4905749.40	673836.60	4905758.1030	673846.8300	8.7030	75.7422	10.2300	104.6529	13.4311
37	4903731.60	675165.6	4903740.2630	675175.2780	8.6630	75.0476	9.6780	93.6637	12.9889
38	4903459.80	676527.6	4903467.3170	676538.6920	7.5170	56.5053	11.0920	123.0325	13.3992
39	4904813.40	677860.8	4904820.5200	677871.8910	7.1200	50.6944	11.0910	123.0103	13.1797
41	4904091.60	678977.4	4904100.1270	678987.8570	8.5270	72.7097	10.4570	109.3488	13.4929
42	4905351.60	674551.2	4905358.8760	674560.5400	7.2760	52.9402	9.3400	87.2356	11.8396
44	4907161.80	673178.4	4907169.7490	673188.1460	7.9490	63.1866	9.7460	94.9845	12.5766
47	4906974.60	678035.4	4906983.9870	678045.6440	9.3870	88.1158	10.2440	104.9395	13.8944
48	4906672.20	676407	4906680.3030	676417.6820	8.1030	65.6586	10.6820	114.1051	13.4076
50	4903965.00	673274.4	4903973.2300	673284.6980	8.2300	67.7329	10.2980	106.0488	13.1826
54	4908514.20	674752.8	4908521.6150	674762.4960	7.4150	54.9822	9.6960	94.0124	12.2063
57	4904047.20	678111.6	4904055.1500	678123.4960	7.9500	63.2025	11.8960	141.5148	14.3079
63	4909116.00	674734.2	4909123.8000	674742.0030	7.8000	60.8400	7.8030	60.8868	11.0330
64	4905649.20	677296.80	4905650.771	677301.612	1.5710	2.4680	4.8120	23.1553	5.0620
65	4913674.80	674664.6	4913683.126	674672.483	8.3260	69.3223	7.8830	62.1417	11.4658
67	4909936.20	674724.60	4909944.201	674732.326	8.0010	64.0160	7.7260	59.6911	11.1224
69	4912534.20	676311.00	4912541.925	676314.992	7.7250	59.6756	3.9920	15.9361	8.6955

MEAN ERROR (m)

7.8241

9.0828

12.0572

STD. DEV

1.2174

1.8187

1.7547

RMSE (m)

7.9156

9.2580

12.1806

90% CIRCULAR ERROR

3.6659

OCT 21, 2003(Quickbird) Multispectral bands

Tim	POINT	HTHG (m)	ESTG (m)	GPS N (m)	GPS E (m)	DN (m)	DN ²	DE (m)	DE ²	ERROR (m)
	1	4908518.40	673797.6	4908524.9500	673806.8370	6.5500	42.9025	9.2370	85.3222	11.3236
	2	4907666.40	674911.2	4907671.7370	674923.5840	5.3370	28.4836	12.3840	153.3635	13.4851
	4	4913647.20	673581.6	4913654.0740	673587.6500	6.8740	47.2519	6.0500	36.6025	9.1572
	5	4912010.40	673070.4	4912017.8540	673080.8540	7.4540	55.5621	10.4540	109.2861	12.8393
	6	4908952.80	673123.2	4908959.0920	673133.7880	6.2920	39.5893	10.5880	112.1057	12.3165
	9	4913683.20	675211.2	4913690.6320	675218.4980	7.4320	55.2346	7.2980	53.2608	10.4161
	10	4913695.20	677376	4913703.0660	677383.1140	7.8660	61.8740	7.1140	50.6090	10.6058
	14	4912416.00	676303.2	4912423.0560	676312.3620	7.0560	49.7871	9.1620	83.9422	11.5641
	15	4911098.40	674709.6	4911104.7910	674719.1890	6.3910	40.8449	9.5890	91.9489	11.5236
	18	4909999.20	673104	4910007.0220	673118.3450	7.8220	61.1837	14.3450	205.7790	16.3390
	19	4910589.60	676320	4910596.8770	676329.6540	7.2770	52.9547	9.6540	93.1997	12.0894
	20	4910560.80	678283.2	4910568.3530	678293.9080	7.5530	57.0478	10.7080	114.6613	13.1038
	23	4909245.60	679423.20	4909253.6320	679434.5430	8.0320	64.5130	11.3430	128.6636	13.8968
	24	4909663.20	677961.6	4909671.1460	677971.2400	7.9460	63.1389	9.6400	92.9296	12.4927
	29	4907284.80	675782.4	4907291.5650	675794.7790	6.7650	45.7652	12.3790	153.2396	14.1069
	30	4907599.20	676716	4907607.4070	676727.0600	8.2070	67.3548	11.0600	122.3236	13.7724
	31	4907385.60	677244	4907392.9850	677255.0560	7.3850	54.5382	11.0560	122.2351	13.2956
	34	4906327.20	675412.8	4906330.5410	675421.1710	3.3410	11.1623	8.3710	70.0736	9.0131
	35	4905751.20	673836.00	4905758.1030	673846.8300	6.9030	47.6514	10.8300	117.2889	12.8429
	37	4903732.80	675165.6	4903740.2630	675175.2780	7.4630	55.6964	9.6780	93.6637	12.2213
	38	4903461.60	676526.4	4903467.3170	676538.6920	5.7170	32.6841	12.2920	151.0933	13.5565
	39	4904817.60	677858.4	4904820.5200	677871.8910	2.9200	8.5264	13.4910	182.0071	13.8034
	41	4904092.80	678976.8	4904100.1270	678987.8570	7.3270	53.6849	11.0570	122.2572	13.2643
	42	4905352.80	674548.8	4905358.8760	674560.5400	6.0760	36.9178	11.7400	137.8276	13.2191
	44	4907162.40	673176	4907169.7490	673188.1460	7.3490	54.0078	12.1460	147.5253	14.1962
	47	4906975.20	678036	4906983.9870	678045.6440	8.7870	77.2114	9.6440	93.0067	13.0468
	48	4906672.80	676406.4	4906680.3030	676417.6820	7.5030	56.2950	11.2820	127.2835	13.5491
	50	4903965.60	673274.4	4903973.2300	673284.6980	7.6300	58.2169	10.2980	106.0488	12.8166
	54	4908516.00	674752.8	4908521.6150	674762.4960	5.6150	31.5282	9.6960	94.0124	11.2045
	57	4904047.20	678112.8	4904055.1500	678123.4960	7.9500	63.2025	10.6960	114.4044	13.3269
	63	4909118.40	674731.2	4909123.8000	674742.0030	5.4000	29.1600	10.8030	116.7048	12.0775
	64	4905648.00	677296.80	4905650.771	677301.612	2.7710	7.6784	4.8120	23.1553	5.5528
	65	4913676.00	674664.00	4913683.126	674672.483	7.1260	50.7799	8.4830	71.9613	11.0789
	67	4909336.80	674721.60	4909344.201	674732.326	7.4010	54.7748	10.7260	115.0471	13.0316
	69	4912536.00	676310.40	4912541.925	676314.992	5.9250	35.1056	4.5920	21.0865	7.4961
MEAN ERROR (m)						6.7269		10.0771		12.2179
STD. DEV						1.4194		2.1676		2.0401
RMSE (m)							6.8709		10.3011	12.3623
90% CIRCULAR ERROR										4.3399